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ABSTRACT

The research project's objectives were: survey of the field, development of new approaches and techniques, investigation of factors in the employment of the trainable mentally retarded (TMR), development of objective measurement of work adjustment behaviors, selective application of new methods, and development of a model vocational evaluation program for the TMR for training. The report reviews the current state of work evaluation for the TMR and research needs. A definition of terms and a bibliography for research are included. The section examining the use of standard tests reviews the validity of the various testing instruments. Work samples and rating scales are evaluated regarding their accuracy. Methodological questions are also raised regarding comprehensive test batteries and interest testing for complete profiles. A review of four articles discusses the TMR as workers. A summary reviews the preceding sections. The conclusions stress the need for: reliable evaluation instruments, further development of the comprehensive test battery incorporating interest tests and sophistication assessment, and improving the rating scale for predicting vocational potential. It was found that standardized tests of aptitude, perception, and dexterity are of little benefit. The identification of test instruments used is appended. A bibliography and index are included. (JB)

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SPECIAL APPLICATIONS OF WORK EVALUATION TECHNIQUES FOR PREDICTION OF EMPLOYABILITY OF THE TRAINABLE MENTALLY RETARDED

September 1974

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PREFACE

Several sophisticated work evaluation units around the country take great pride in the fact that now they can complete a work evaluation for the non-trainable mentally retarded client in one or two days that used to take them six to twelve weeks. They should be complemented! How valid is the information obtained for predicting employability? Well, that's another question.

Until recently work evaluation for trainable mentally retarded has always taken one or two days, especially the test and work sample phase sometimes referred to as the "vestibule evaluation." The evaluator was hard pressed to find a test or sample in his or her repetoire that a TMR was capable of taking. This problem served only to reinforce the evaluator's impression of the "TMR stereotype": a negligible producer who needs something to keep him or her busy. In fact one can recall not too many years ago, that work evaluation was considered unfeasible for mentally retarded with IQ's below 50.

The movement to develop work evaluation tests and work samples appropriate for the trainable mentally retarded has received impetus from several sources. First, those habilitation facilities that wanted to meet state vocational rehabilitation expectations had to offer a recognizable work evaluation service. Those that incorporated a "vestibule phase" into their work evaluation typically purchased a work sample package because of the prestigious apparatus. The resultant problem was that the evaluator could find little positive to say about the TMR's aptitudes and abilities compared to the "criteria" furnished in the package. Second, evaluators began to recognize differences in performance and behavior among the trainables that conventional testing and work sampling tended to overlook due to high cutoff criteria.

The report prepared by Allan Doctor that follows, reviews the current state of work evaluation for the trainable mentally retarded. The impression one gets from reading the report, and rightly so, is that many people are scrambling about developing new approaches and new techniques, few are taking the time to properly validate instruments, to set-up cross-validation and replication studies.

TO THE READER WHO IS SHOPPING AROUND FOR EVALUATION TOOLS, be wary of fancy packages. Yes, you will have a ready-made evaluation unit, but how will it benefit your TMR clients? That is, does the manual have norms for TMR'S? Can a non-reader take the tests or samples? Are the samples related to job opportunities in your geographical area.

TO THE READER WHO HAS A GREAT NEED TO DEVELOP NEW TESTS AND SAMPLES, to reach for the "pie in the sky", to create another WAIS, chances are your idea has or is being tried. Just about anyone can make a pegboard. But, provide evidence that a particular test or sample "works" for your clients.... you'll be heads above all the developers in terms of helping your clients.

TO THE READER WHO IS LOOKING FOR READY-MADE NORMS, remember what's normal for the goose may be deviant for the gander. The Equal Employment Opportunity Commission has stressed the importance of test validation based on local norms. We might expect that an "average" performance on the TOWER Electronics series by New York standards to be grades higher in geographic areas where electronics industries are less competitive.

TO THE READER WHO FINDS A REPORT FIFTY PAGES OR LONGER TO BE AVERSIVE, there is a Summary of the Report beginning on page 65.

The tone of the Preface may strike you as flippant or demeaning in comparison to the importance of the subject. That was not the intent. On the contrary, I am deeply concerned about the topic. I see the future of work evaluation for the trainable mentally retarded as hopeful, but also as complex and confusing especially if we continue to work at cross-purposes. Let's take an intensive look at what predictive tools are currently available and give them ample opportunity to prove their statistical usefulness or worthlessness instead of preemptorily valuing or condemning them before their time.

William J. Timmerman, Ph.D.

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INTRODUCTION

The vocational rehabilitation facilities and sheltered workshops of Ohio are dead-end streets for some clients with competitive potential. This is due, in part, to the inability of evaluation units to adequately predict the competitive potential of certain groups of clients. Historically it was not too many years ago that all mentally retarded were considered incapable of competitive employment, and in fact, dangerous. When that was proven false certain arbitrary IQ cutoff scores were proclaimed as cutoffs under which competitive placement was "unfeasible". The present "floor" accepted by many facilities and even some researchers is an IQ of fifty. But clients with below 50 IQ's are being competitively placed and are holding that employment.

Prompted by this, Quadco Rehabilitation Center in Stryker, Ohio, applied to the Department of Mental Health and Mental Retardation of the State of Ohio for a grant to explore: "Special Applications of Work Evaluation Techniques for Prediction of Employability of the Trainable Mentally Retarded."

In the position paper which accompanied the application, the author stated that based on his review of available literature, "there are no truly validated methods of assessing aptitude for work, the kinds of jobs the trainable mentally retarded should be placed on in a workshop setting, and more important, potential for eventual job placement outside the sheltered workshop."[1]

The paper notes that the majority of tests now used have floors too high to differentiate within the TMR population and that reliance upon one-trial learning merely reinforces the initial retardation diagnosis.

The paper also states that some trainable mentally retarded are automatically placed into an adult activities center based on staff impression rather than objective data.

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[1]Quadco Rehabilitation Center, "A Position Paper on Vocational Work Evaluation of the Trainable Mentally Retarded" (unpublished paper submitted to the Department of Mental Health and Mental Retardation of the State of Ohio, 1972) p.11

Although there does appear to be a system of natural selection whereby some individuals with significant potential for employment outside the activities center are ultimately identified, expedient predictive measurement would save a great amount of time, expense, and personal waste.

This is not meant to imply a lack of research and available data dealing with work evaluation for the mentally retarded. Many significant studies have taken place especially within the last decade. Generally, however, these studies were based on populations which were largely or exclusively composed of those classed as either "borderline" or "educable" retardates. Some researchers even go so far as to assume that when the population considered is characterized by an IQ range in the fifties or below, it is useless to think of these people in terms of competitive employment.[1] Rotman, for example, in his study on the effect of motor skill practice upon the mentally retarded writes: "Patients who had an intelligence quotient below fifty were eliminated because, according to the institutional authorities, they would be considered unlikely potential candidates for employment."[2]

Increasingly, studies are emphasizing the fact that the Moderate Retardate, although usually considered "incapable of meaningful achievement in traditional academic subjects" is "capable of profiting from programs of training in self-care, social and simple job or vocational skills."[3] A case in point is the study of Delp[4] involving two hundred students of the Training School at Vineland, New Jersey, wherein it was found that of sixty-nine jobs or training areas in use at the school, fifty-four were being filled by clients with IQ's under sixty. Delp's viewpoint that TMR adults can realistically be considered for competitive employment, is being verified by local experience. Of the thirty-nine retarded placed in competitive employment by the Quadco Rehabilitation Center of Stryker, during the 1973 fiscal year, twelve had IQ's of fifty-five or below.

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[1]Jack Tobias and Jack Gorelick, "Work Characteristics of Retarded Adults at Trainable Levels", Mental Retardation, December 1963, 339-340.

[2]C. Rotman, "A Study of the Effect of Practice upon Motor Skills of the Mentally Retarded" (unpublished Doctor's dissertation, Boston University School of Education, 1963) p.7

[3]Rich Heber, "A Manual on Terminology and Classification in Mental Retardation", Monograph Supplement to American Journal of Mental Retardation Second Edition 1961, p.96

[4]Harold A. Delp, "Criteria for Vocational Training of the Mentally Retarded A Revised Concept of the Necessary Mental Level", Training School Bulletin, August 1957, pp.14-20

If some TMR adults are capable of competitive employment, how are they identified? Most standard tests and test batteries are not suitable because of reading or academic requirements. Many others, such as those which emphasize single trial testing place the TMR at a disadvantage because of the individual's associated slow learning rate.[1]

The following general objectives were therefore established for the present research project:

1. A thorough survey of what has been done and what is currently being done in vocational evaluation of trainable mentally retarded adults.

2. The development of scientifically validated evaluation tools, tests and job samples, from which accurate prediction of productivity and employability potential can be made at an early stage in the individual's rehabilitation program.

3. Investigation of the factors most important in eventual employment of the TMR.

4. Development of a phase of a vocational evaluation program based on objective measurement of work adjustment behaviors.

5. Selective application of new methods, knowledge and techniques of vocational evaluation of the TMR as acquired through the research project.

6. Development of a model vocational evaluation program for the TMR to be used for training purposes for personnel in other facilities.

The following pages contain the results of the survey called for in the first objective. The survey findings indicate that the body of useful literature and tools applicable to vocational evaluation of the TMR adult is very small. For those studies cited, the results are frequently ambiguous and occasionally conflicting. The vast majority of the studies were concerned with secondary issues or failed to lead to really significant, practical conclusions. In all, the research cries out strongly for further work specifically designed to assess the vocational potential of the trainable, mentally retarded adult.

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[1]Jack Tobias, "Evaluation of Vocational Potential of Mentally Retarded Young Adults", Training School Bulletin, February 1960, p.122

DEFINITION OF TERMS

TRAINABLE MENTALLY RETARDED: In attempting to define this term for purposes of this study, no hard and fast boundaries will be drawn. It will be operationally defined in terms of IQ basically because this is the descriptive criterion used in the studies to be examined. The group being researched lies 3.01 to 4.00 standard deviation units below the mean of the general population according to the AAMD Manual on Terminology and Classification in Mental Retardation (2nd ed.), 1961.[1] According to the same source this would correspond to an IQ range of 51-36 on the Revised Stanford-Binet Tests of Intelligence and 54-40 on the Wechsler-Bellevue Intelligence Scale, Children and Adult forms.

Kirk (1962)[2] defined a Trainable Mentally Retarded (speaking specifically of children) as "one who, because of subnormal intelligence, is not capable of learning in classes for educable mentally retarded but who does have potentialities for learning (1) self care, (2) adjustment to the home and neighborhood, and (3) economic usefulness in the home, a sheltered workshop, or an institution." His definition uses an associated IQ range of 20-49.

Efforts have also been made to define various levels of adaptive behavior within the retarded population. The system devised by Sloan and Birch cuts across the boundaries of other definitions. Level II, described as "Moderate" is classed in the school age portion of development as "Educable" and, as adults, is defined as follows: "Capable of self-maintenance in unskilled or semi-skilled occupations; needs supervision and guidance when under mild social or economic stress." Those who are classed as "Trainable" during their school years are labeled "Severe" (Level III) and their adult social and vocational adequacy is described as follows: "Can contribute partially to self-support under complete supervision; can develop self-protection skills to a minimal useful level in controlled environment."[3]

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[1]Richard C. Scheerenberger, "Mental Retardation: Definition, Classification, and Prevalence", Mental Retardation Abstracts, Vol.1, No.4, (October-December 1964) pp. 432-441.

[2]S. Kirk, Educating Exceptional Children, Boston: Houghton Mifflin Company, 1962.

[3]W. Sloan and J. Birch, "A Rationale for Degrees of Retardation", American Journal of Mental Deficiency, 1955, 60: 258-259.

The term "Trainable Mentally Retarded", as used in this study, will be roughly equated with a full-scale IQ of 40-54. However, tests will be reported upon if their population mean falls within this range or within one standard deviation on either side. It will be assumed in these latter cases that the test population contains a sufficient proportion of TMR's for the results to generally reflect their performance. Where a smaller quantity of TMR's is involved, it will be assumed that the test results do not significantly reflect their participation.

VOCATIONAL WORK EVALUATION: Work Evaluation as defined by the U.S. Department of Health, Education and Welfare[1] means: "The appraisal of the individual's capacity including patterns of work behavior, ability to acquire occupational skills, and the selection of appropriate vocational goals." This definition includes "the utilization of work, simulated or real, to assess the individual's capacities to perform in a work environment: work experiences, within the facility or in conjunction with outside industry, to assist the individuals to acquire knowledge, develop skills and/or assess readiness for job placement" and "self appraisal".

The elements contained in the above definition could be interpreted to include the entire life spectrum of the evaluee. In fact, as noted by Speiser: "The determination of potential for achieving vocational adjustment is an integral part of a person's total life functioning."[2] Vocational Evaluation must be able to call upon a wide range of data involving such fields as psychology, sociology, and medicine. In one sense of the word, therefore, a project dealing with vocational work evaluation would need to include the instruments and procedures of all these fields.

Because the majority of Work Evaluation personnel are not trained to gather and interpret this broad spectrum of data, a more narrow definition becomes a necessity to provide practical boundries for this paper.

For the purposes of this study work evaluation will be defined as follows: "The assessment of present capacities and potentials of handicapped adults as related to productive work. This assessment is to include the use of such tools as are readily available to a work evaluator to determine present and future capabilities, interests and adjustment to work and its environment."

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[1]U.S. Department of Health, Education, and Welfare, Social and Rehabilitation Service, Rehabilitation Services Administration, Standards for Rehabilitation Facilities and Sheltered Workshops, (Washington D.C., 1969).

[2]Allen Speiser, "The Professional in Vocational Evaluation", in Readings in Work Evaluation I, ed. Walter A. Pruitt, (Materials Development Center, Stout State University, Menomonie, Wisconsin, 1970) p.2

Tests which presuppose a master's degree in psychology for proper administration will be omitted from the scope of this study except where they form part of a test battery.

In essence, therefore, the instruments dealt with in this study will be tests of perception, dexterity, aptitude, interest, and vocational ability; samples of real and simulated work; and methods used for observational assessment of work behaviors and aptitudes.

All published tests mentioned in the studies, including those which would not customarily be administered in the work evaluation unit, are described in the appendix. Technical data and reviews were utilized when available.

PROCEDURE

The goal of the initial phase of this study is a comprehensive survey of literature regarding predictive measures of employability for the TMR. In an effort to discover and isolate these resources, the first step was to consult summaries of research, bibliographies and conduct computer searches. The following are the major sources used in each case:

SUMMARIES OF RESEARCH

Cobb, Henry B., The Forecast of Fulfillment, 1972, Teachers College Press, New York.

Gold, Marc W., "Research on the Vocational Habilitation of the Retarded, the Present, The Future" in Ellis, Norman R., (ed.) International Review of Research in Mental Retardation Vol. 6, 1973, Academic Press, New York.

Windle, C. D., "Prognosis of Mental Subnormals", American Journal of Mental Deficiency, Monograph Supplement, 1962, 66.

Wolfensberger, Wolf, "Vocational Preparation and Occupation", in Baumeister, Alfred A., (ed.), Mental Retardation Appraisal, Education, and Rehabilitation, 1967, Aldine, Chicago, p. 232ff.

Long, Huey B., The Education of the Mentally Retarded Adult: A Selective Review of Recent Literature, 1973, Adult Education Association of the USA, Washington, D. C.

BIBLIOGRAPHIES

(ed) Fry, Ronald R., Work Evaluation An Annotated Bibliography, 1971, Materials Development Center, University of Wisconsin - Stout. Menomonie, Wisconsin 54751

- Work Evaluation An Annotated Bibliography 1947-1970, 1971 Supplement 1972, Materials Development Center, University of Wisconsin - Stout. Menomonie, Wisconsin 54751.

- Work Evaluation and Adjustment An Annotated Bibliography 1972 Supplement, 1973, Materials Development Center, University of Wisconsin - Stout. Menomonie, Wisconsin 54751

Cobb, Henry V., The Predictive Assessment of the Adult Retarded for Social and Vocational Adjustment, A Review of Research, Part I, ANNOTATED BIBLIOGRAPHY, 1966, South Dakota University, Vermillion.

COMPUTER SEARCHES:

The following computer searches were run with the indicated Descriptors:

DATRIX
Xerox University Microfilms
P.O. Box 1346
Ann Arbor, Michigan 48106

PROBE
Educational Resources Information Center (ERIC)
School of Education, Indiana University
Bloomington, Indiana

PASAR
American Psychological Association
1200 17th St., N.W.
Washington, D.C.

Descriptors used: Work, Sample, Test, Behavior, Adjustment, Evaluation, Prediction, Employment, Predictive Measurement, Job, Prediction of Job Adjustment, Prediction of Employment Success, Prediction of Job Success, Mental Retardation, Trainable Mentally Handicapped, Mentally Handicapped, Vocational Rehabilitation, Vocational Training, Rehabilitation, Vocational Adjustment, Prediction, Predictive Measurement, Predictive Validity.

A manual search along the same lines was conducted by:

MATERIALS DEVELOPMENT CENTER
University of Wisconsin - Stout
Menomonie, Wisconsin 54751

The bibliography of each research article was examined for further potential sources and all articles and publications were listed and cross-indexed. Three hundred and thirty-seven works were catalogued. By checking all of these against the annotated bibliographies for clarification of their content, the list of potentially relevant studies was reduced to seventy.

Finally, approximately twenty studies were found which appeared to contain sufficient factual and statistical data to warrant in-depth analysis. These studies dealt primarily or exclusively with a TMR population, were presented in sufficient detail to warrant analytical study (there are some exceptions to this requirement which are included

merely for information because they represent unique types of studies) and contain information which will contribute to predictive work evaluation for this population.

There are, of course, omissions. Some studies are no longer available, especially in their original form. Revised forms and published editions often do not contain the complete research underlying a project. Older articles in publications are frequently unavailable either from the publisher or libraries stocking the more recent issues. Some research projects have never been published and have simply disappeared.

Some inquiries for information and literature went unanswered, but response from all over the country was generally good and somewhat better than was expected.

THE USE OF STANDARD TESTS

When this study began, it was assumed that there would be a significant amount of research concerning the performance of TMR adults on standard tests easily accessible to the Work Evaluator. A brief review of the arguments pertaining to the use of this type of test with a retarded population might be in order.

Tobias states: "By definition, retardation assumes a slow rate of learning. Standard tests that measure one-trial learning will reinforce the initial diagnosis of retardation without supplying the information more necessary for the determination of vocational feasibility."[1]

Gellman[2] suggests that the very "strength" of standardized tests may be their weakness. They are designed and administered to maximize the subject's performance. They are kept short to eliminate fatigue or declining motivation. As a result, they poorly reflect the client's general orientation toward work or what would be expected from him in an actual job performance.

Also, despite the fact that the conventional tests we are discussing here are very specific in nature, the results are often generalized and the scores interpreted to reflect general "working" ability.

Frequently non-work attitudes and behaviors can be sublimated for the length of time necessary to take a short, standard test and the isolated setting necessary for the administration of such a test sheds no light on the client's performance under normal working conditions.

Jack Tobias and Jack Gorelick[3] in 1960 made an effort to determine the predictive ability of a single standard test, the Purdue Pegboard, for foretelling sheltered workshop performance of a retarded population.

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[1]Jack Tobias, "Evaluation of Vocational Potential of Mentally Retarded Young Adults", op. cit. p.122.

[2]William Gellman, "The Principles of Vocational Evaluation", Rehabilitation Literature, April 1968, pp. 98-102.

[3]Jack Tobias and Jack Gorelick, "The Effectiveness of the Purdue Pegboard in Evaluating Work Potential of Retarded Adults", The Training School Bulletin, Nov. 1960, pp. 94-103.

Specific questions raised in the study were:

(1.) How do retarded adults compare with normals in a measure of dexterity that is presumably uncorrelated with intelligence?

(2.) Can the Purdue Pegboard discriminate between different levels of dexterity below those of the standardization population of normals?

(3.) Is there a relationship between dexterity and intelligence within the retarded range?

(4.) Are the dexterity scores more closely related to some measures of IQ than to others?

(5.) How valid a predictor of the vocational success of a retarded population is the Purdue Pegboard?

(6.) How does the Purdue Pegboard compare to more commonly used measures in predicting vocational efficiency?

The test population was composed of clients of the AHRC Sheltered Workshop and Training Center in New York City. Eighty-one clients composed the test sample although it is not noted what, if any, criteria were used in selecting the sample. The sample population included all IQ ranges of retardation above 30. (Significant IQ breakdowns and groupings will be noted as appropriate). For this reason some of the results are not applicable to the TMR population. Most significant for our purposes is a partial replication of the initial study, included in the same cited article, in which a test sample of ninety was divided according to IQ range (full scale WAIS) with some lower scores obtained by the Stanford-Binet. In the latter study the responses of the TMR group are specifically noted.

Performance on the Purdue Pegboard was correlated with quantity of production on two separate bench operations. One was a ball-point pen assembly involving six parts, varying in size from a small spring to a five inch barrel. The other, the "Wire-Clamp" assembly, required assembly of four metal parts to form a clamp. A U-bolt, threaded at both ends, supported a metal saddle held in place by two identical nuts which were tightened by hand.

The Purdue Pegboard was administered according to standard procedures. Duplication of directions or demonstration was given as necessary. Clients were trained in the two workshop assignments until they had mastered the entire operation. Average production figures were based on fifteen hours for the ball-point pen and four hours for the wire-clamp assembly. The time sequence between administration of the Purdue and the two assembly operations was not noted.

Significant differences were found in performance on the Purdue, not only between retarded and "normal" adults but also between different levels within the retarded range.

DIFFERENCES IN PURDUE SCORES AT THREE LEVELS OF RETARDATION - ALSO COMPARISON WITH NORMAL POPULATION MEANS.

IQ Level	Mean R+L+B	Standard Deviation	Mean Assembly	Standard Deviation
30-49	86.4	13.3	41.2	8.8
50-64	107.2	17.9	57.4	16.1
65-80	121.7	14.5	78.0	14.9
Industrial Applicants	135.0	(1)	104.0	(1)

(1) Standard deviation figures for three trials are not available.

Of the retarded samples investigated, no one in the IQ 30-49 group reached the mean of industrial applicants on either R+L+B or Assembly. (Eight percent of the IQ 50-64 group achieved the industrial mean on R+L+B but none on Assembly).

Based on the initial study (IQ range 35-78, Mean 63) the authors suggest a substantial relationship between intellectual functioning (as measured by the WAIS) and manipulative dexterity. The authors further consider the factors subsumed by Wechsler in the Verbal Section of the WAIS significantly less valid as predictors of dexterity than those included in the Performance Section of the WAIS.

CORRELATIONS BETWEEN DEXTERITY AND INTELLIGENCE

	R+L+B	Assembly
WAIS Full Scale IQ	.563	.666
WAIS Performance	.567	.730
WAIS Verbal	.340	.427

All coefficients are significant at better than a .01 level of confidence.

According to the study, correlation between the Purdue and the two workshop tasks is higher than between full scale IQ and workshop tasks.

CORRELATION BETWEEN PURDUE PEGBOARD, FULL SCALE IQ AND SELECTED WORKSHOP TASKS.

Workshop Task	Purdue R+L+B	Purdue Assembly	Full Scale WAIS
Ball-Point Pen Assembly	.788	.678	?
Wire-Clamp Assembly	.748		.44

No relationships are listed between the workshop tasks and the performance section of the WAIS.

This study has more applicability to general populations of retarded than to TMR groups. Figures citing relationships between the Purdue and work (the two workshop tasks) are discussed only in terms of the total. Whether the correlation holds true for the TMR subgroup is uncertain.

The workshop tasks are both assembly operations which could be expected to correlate with the Purdue Pegboard. It is somewhat questionable, therefore, whether the results could be generalized to other types of tasks such as those found in service areas or even those requiring different types of movements.

There is no attempt to relate the study to anything other than quantity produced which is only a partial criterion of production. The authors do not comment regarding production quality. Therfore, for example, we are not told whether or not incorrectly assembled units counted as finished pieces.

The test sample would appear atypical since it is noted that it was composed of adults "referred to the Workshop because of their inability to make a vocational adjustment in the community." Therefore, it is questionable whether the results would apply to the entire TMR population.

Interrelation between R+L+B and Assembly was significantly higher (.82) among the retarded than among two normal populations (college students .58 and veterans .53). The authors had assumed that the correlation in the MR sample would be less "since the Assembly subtest requires more than merely manipulative skills reflecting greater decrease of speed with greater complexity of task." They suggest that the results indicate IQ may have significant bearing also on simpler subtests. It could also mean that other, undiscovered variables were at work. The proportion of increase from first to third trial for the wide range MR sample is approximately the same as for college students between trials one and three.

The R+L+B gain for the retarded between the two trials was 6.4%, for the college students it was 8.1%. On the assembly subtest the gain for retarded was 12.8%, for college students 12.6%. The authors note that there is less than one chance in a thousand that the differences between the means for the first and third trials of the retarded sample ("t"=7.7) would have been arrived at by chance. They do not note which subtest they are referring to nor do they present sufficient data to compute any of the mean differences for significance.

Although there might be significant results from the study related to general populations of retarded, they are of limited benefit for TMR evaluation. The results suggest that there are apparent levels of dexterity corresponding to levels of retardation. Whether or not the loss of dexterity is due to the level of retardation as the authors indicate remains to be seen. Other factors such as lack of vocational exposure should be considered before making the sweeping conclusion of

a relationship between dexterity and intelligence within the retarded range. Insufficient information is available regarding relationships between performance on the test and total sheltered workshop performance.

Several studies have been conducted pertaining to the functioning of the Trainable Mentally Retarded on assortments or batteries of standard tests and the possible predictive implications of these results. In this area researchers generally attempt to predict client performance only from one stage of the evaluation program to the next, rather than attempting prediction of ultimate employability from an initial battery of scores.

Cobb[1] considered the pioneer study in this area to be the four year project carried on by Parnicky and Kahn[2], at the E.R. Johnstone Training and Research Center in Bordentown, New Jersey (referred to as the "Johnstone" project). The relatively high IQ mean (mean 64, range 30-126) excludes the Johnstone study from detailed coverage in our present survey but a general review of the methods used will provide an example of attempted prediction from a test battery.

The vocational training program of the Center consisted of five phases: Phase I: prevocational evaluation (8 weeks); Phase II: Half-time vocational training, on campus (one semester); Phase III: Full-time vocational training with normal work day, on campus (two or three semesters); Phase IV: Daywork in the community, retaining residence at the Center (until competence is demonstrated); Phase V: On jobs and in-residence in the community with follow-up service by State Division of Mental Retardation.

Three types of evaluation were undertaken with results compared to relative performance throughout the phases of the program. These were vocational appraisal, using work samples and real work situations; psychological appraisal, comprised of a battery of motor, personality-temperament, and intellectual tests; and vocational interest and sophistication assessment using a preliminary form of a reading-free device for measurement of the vocational interests of educable, mentally retarded adolescents.[3]

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[1]Cobb, Henry V., The Forecast of Fulfillment, (Teachers College Press, New York 1972) p. 68

[2]Parnicky and Kahn, Evaluating and Developing Vocational Potential of Institutionalized Retarded Adolescents, (unpublished research study by Edward R. Johnstone Training and Research Center, Bordentown, New Jersey, 1963).

[3]This was a preliminary form of the VISA (Vocational Interest and Sophistication Assessment). See review of same.

Results in general indicated that the prevocational battery became increasingly less predictive through succeeding stages of the program and were virtually zero for final community employment.

Cobb in his critical review of the project (Cobb p.71f) made several significant observations. He felt the entire project suffered from "halo" effects caused by the fact that repeated field ratings of a given client were always given by the same supervisor. He also suspected that the ratings were influenced by the motor performance of the clients (i.e., that supervisors had a tendency to allow their ratings to be based mostly on the motor efficiency of the individual clients). If this were the case, more objective ratings would have a tendency to reduce the relationship between field ratings and motor tests (the latter being the most highly predictive of the psychological tests).

There was an absence of significant predictability between any of the prevocational measures and the ratings by community employers. This could merely be reflective of the low reliability and/or validity of rating scales in general.

The Johnstone project, possibly the most thorough of its kind, indicates the difficulty involved in vocational prediction, even from state to stage of a program.

In 1967, Lorne Elkin carried out a study with a TMR population in which he attempted to develop a battery of tests which would be predictive of performance on sheltered workshop tasks.[1] His next apparent goal was then to try out his best predictors in a non-sheltered employment setting. Unfortunately, when he continued the study on through to this conclusion (Elkin 1968) he used a second population which was composed of EMR rather than TMR subjects.[2] It is uncertain whether he assumes that what is valid for one population will be equally valid for the other or whether he considers the TMR population as generally unsuitable for competitive employment.

The stated goals of his 1967 project were as follow: (1) Objectifying criteria for measuring success on the job. (2) Predicting work potential of institutional TMR's. (3) Estimating predictive value of work samples.

The population chosen for his study consisted of fifty-eight residents of the Saskatchewan Training School at Moose Jaw. They ranged in age from 15 to 52 and had an IQ range from 20-55 (mean 34.4).

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[1]Lorne Elkin, "Predicting Productivity of Trainable Retardates on Experimental Workshop Tasks", American Journal of Mental Deficiency, January 1967, pp. 576-580.

[2]Lorne Elkin, "Predicting Performance of the Mentally Retarded on Sheltered Workshop and Non-Institutional Jobs", American Journal of Mental Deficiency, Vol. 72, pp. 533-539.

Although one client was excluded because of color blindness, no indication is given whether or not other criteria of exclusion were used to determine the final population. On the surface it would appear questionable that within such a wide IQ range, no one was excluded because they could not comprehend or successfully learn the tasks required. Caution of course should be exercised in generalizing the results from such a small homogeneous group, especially one in a highly structured institutional setting.

Procedure: Clients were trained on four experimental tasks of varying complexity: (1) Sort by color, (2) Sort by geometric form, (3) Assembly: Bolt, two nuts, two washers; (4) Combined operation: Measure and cut two wires, assemble using screwdriver. Clients were trained and pretested on a sample, then administered each of the experimental jobs for six consecutive days. The work periods were held to a maximum of forty-five minutes due to limited quantities of material. Unfortunately this length of time may have caused invalid results. It would seem that longer periods might be necessary in order to allow factors such as fatigue, limited attention span, and boredom to take effect. Figures pertaining to the performance of individual clients for longer periods of time might have shed light on this problem.

The four tasks were used as the criteria. The predictors were a battery of eighteen tests and factors: Stanford Binet, Form L-M; Raven Colored Progressive Matrices; Peabody Picture Vocabulary Test; Koh Blocks; Porteus Maze Test; O'Connor Finger Dexterity Test; Crawford Small Parts Dexterity Test; Bennett Hand-Tool Dexterity Test; Purdue Pegboard; Dynamometer; Age; Age at Admission; Length of Institutionalization; Behavior Rating Scale - Adjustment to Work; Color Sorting; Form Sorting, Hand Assembly; Tool Assembly.

The results were apparently determined by comparing total work score with each of the predictor variables including the individual work samples. Significant correlations found are listed below:

CORRELATIONS BETWEEN TOTAL WORK SCORES
AND NINETEEN PREDICTOR VARIABLES

	Variable	Total Work	
		Female	Male
1.	Revised Stanford Binet, Form L-M	.54(1)	.46(1)
2.	Raven Progressive Matrices (1956)	.58(1)	.56(1)
3.	Peabody Picture Vocabulary Test (B)	.29	.35
4.	Kohs Blocks	.41(2)	.55(1)
5.	Porteus Maze Test	.47(1)	.61(1)
6.	O'Connor Finger Dexterity Test	-.68(1)	-.56(1)
7.	Crawford Small Parts (Pins & Collars)	-.59(1)	-.48(1)
8.	Crawford Small Parts (Screws)	-.62(1)	-.58(1)
9.	Bennett Hand Tool Dexterity	-.73(1)	-.65(1)
10.	Purdue Pegboard (Total Scores)	.80(1)	.64(1)

CORRELATIONS BETWEEN TOTAL WORK SCORES
AND NINETEEN PREDICTOR VARIABLES
(Continued)

Variable	Total Work Female	Total Work Male
11. Dynamometer (Strength)	.59(1)	.36(2)
12. Work Sample I(Color Sort)	.69(1)	.61(1)
13. Work Sample II (Form Sort)	.80(1)	.66(1)
14. Work Sample III (Hand Assembly)	.79(1)	.70(1)
15. Work Sample IV (Tool Assembly)	.56(1)	.52(1)
16. Age	.13	.40(2)
17. Age at Admission	-.26	.15
18. Length of Institutionalization	.28	.43(2)
19. Rating Scale (Adjustment to Work)	.66(1)	.55(1)

(1) Significant at .01 level of confidence
(2) Significant at .05 level of confidence

Significant correlation is found between the work samples and the majority of tests. Elkins states this correlation indicates a "general ability" factor encompassing intellectual and psychomotor skills is related to job success (he refers to: Abel 1925; Tizard & O'Connor 1950; Wagner & Hawver 1965). But where has Elkin actually related the test battery to "job success"? He concludes that the relationship between experimental jobs and institutional, sheltered workshop, and non-institutional jobs has yet to be established. He does state that partial support for the validity of the experimental jobs, hence the criterion, comes from the significant positive correlations found between ratings of adjustment to work on cottage duties and performance on the experimental tasks. The possibility must be raised, however, that the same contamination due to rater bias (supervisor ratings prejudiced by dexterity scores) could exist here as was suspected in the Parnicky and Kahn study discussed earlier. This, coupled with the unrealistic length of work periods (eliminating accurate samplings of work behaviors, motivation, etc.) and the failure of Elkin in the 1967 study to actually follow through and substantiate his findings in either sheltered or competitive employment makes this study of relatively little use.

A somewhat similar study using some of the same standard instruments was conducted in Akron, Ohio by Edwin E. Wagner and Dennis A. Hawver.[1]

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[1]Edwin E. Wagner and Dennis A. Hawver, "Correlations Between Psychological Tests and Sheltered Workshop Performance for Severely Retarded Adults", American Journal of Mental Deficiency, March 1965, pp. 685-691.

Wagner and Hawver classify their paper as an attempt to develop one or more test predictors of sheltered workshop success in a sample of severely retarded adults. To be considered as part of the test population the client had to have a tested IQ of less than fifty. The Stanford-Binet, for L, M, or L-M was used. The test population of twenty-seven had an average age of 23.7 (R=21/34, SD=3.1) and an average IQ of 34.4 (R=13/49, SD=8.8). The study took place at the sheltered workshop operated by the Summit County Council for the Retarded Child. Note here that about 34% of the test population (assuming a normal curve) lies below the TMR range.

The test instruments used were the O'Connor Finger and Tweezer Dexterity Tests, Placing and Turning Subtests of the Minnesota Rate of Manipulation Test, The Active Score of the Hand Test, Goodenough-Harris Draw-A-Man Test, Bender Visual-Motor Gestalt Test and the Stanford-Binet IQ.

Clients were administered the test battery. The chief instructor of the workshop was then asked to rank all subjects according to these criteria (he had no access to the test scores): 1. Respects authority and is willing to take directions. 2. Generally completes assignment; work is usually of good quality. 3. Seems to get along reasonably well with co-workers. 4. Learns new workshop skills without too much difficulty.

These rankings were not returned to the experimenters until all tests had been administered. Test results were as follow: The null hypothesis (i.e., that there was no significant correlation between performance on the test battery and rankings by the chief instructor) was rejected for all eight tests. As might be expected, a high degree of overlap was noted thereby indicating that the instruments were testing much the same thing. The authors comment: "The correlations between the Bender Visual-Motor Gestalt (BG) rankings and the criterion rankings is exceptionally high and accounts for approximately 79% of the total variance. On the basis of the BG alone, it would be possible to predict rankings of workshop performance for these subjects with a high degree of accuracy."

SPEARMAN RHO INTERCORRELATIONS BETWEEN EIGHT TESTS AND CRITERION RANKINGS OF WORKSHOP SUCCESS

Variables	Criterion Ranking
O'Connor Finger Dexterity	.66(1)
O'Connor Tweezer Dexterity	.50(2)
Minnesota Rate of Manipulation Placing	.64(1)
Minnesota Rate of Manipulation Turning	.53(2)
Active Score of the Hand Test	.57(2)
Goodenough-Harris Draw-A-Man	.71(1)
Bender Visual-Motor Gestalt Test	.89(1)
Stanford-Binet IQ	.63(1)

(1) Significant at .001 level of confidence
(2) Significant at .01 level of confidence

The following considerations should be noted in regard to this study:

1. Due to the small size and geographic limitation of the sample, the authors point out that it would be premature to generalize the findings.

2. The validity was concurrent, in other words the test battery and the rating were done at approximately the same time. This makes it difficult to say that the test battery could actually predict the performance in the shop.

3. The use of a single rater for each client may also have produced a picture which did not accurately reflect performance since the rating might have been influenced by other factors.

4. It should be noted that the study only purports to predict performance in a sheltered workshop. Even if the tests predicted the criterion, a carryover prediction of competitive employment should not be made.

5. The workshop in which the study took place appears to provide only benchwork and woodworking types of jobs for clients. The question must be raised whether the predictiveness of the various test instruments would be as high in service areas such as maintenance and food service.

Although much additional research should be carried on before drawing any generalized conclusions, the test does appear to encourage further exploration of some of the test instruments.

Wagner and Hawver draw two far-reaching implications from their study. First, they feel that the study lends some support to the theory that there is a single "intactness" factor found in low grade mental defectives. In other words, that there is a single factor in retardation which causes repression in all areas of learning and performance. The authors base their contention upon the high degree of correlation between the various test instruments they used and the criteria which they were supposed to measure. Second, they see this high correlation as supporting the validity of "psychological"[1] testing with a retarded population even though they note that previous studies have failed to reveal equally significant results. Wagner and Hawver

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[1]"Psychological" testing as used by Wagner and Hawver appears to have a more general implication than is usually ascribed to it. The authors apparently have used this title to cover all standardized tests whether they would normally be administered by a trained psychologist or a work evaluator.

explain the low correlations of previous studies by suggestion: "Criterion measures may need to be re-evaluated - 'Successful' predictions may depend on the nature of the criterion and/or who rates the criterion." Cobb[1] quotes several studies which call attention to this need for objectification of criteria of 'success'.

The size of the Summit County sample and the fact that determination of "success" was based on the rating of a single instructor must necessitate some caution in the uncritical acceptance of the results.

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[1]Henry V. Cobb, Forecast of Fulfillment, op. cit., pp. 9-11

WORK-SAMPLES

A work-sample is defined by Neff as a "mock-up, a close simulation of an actual industrial operation, not different in its essentials from the kind of work a potential employee would be required to perform on an ordinary job."[1] By definition then, the work-sample can actually be taken from industry or it can simulate an industrial operation.

Although a number of evaluators feel work samples are superior to standardized tests, especially with retarded populations,[2] others feel standard tests reveal as much if not more[3] than samples.

Generally, the following arguments are presented in favor of work samples: (1) they are concerned with the same skills, aptitudes and abilities required by a larger criterion task obtained from competitive industry.[4] (2) Because they more closely approximate 'real work' job samples will not be subject to some of the motivational problems evident on standard tests.[5] (3) Many of the intrusive factors which potentially affect test scores are less likely to influence work task performance. Included in these factors are recency of schooling, educational deprivation, excessive anxiety, speech and hearing impairment, etc.[6]

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[1]Neff, W., "An Overview of the Problem of Work Evaluation" from a paper read at the 1965 Convention of the APGA at Minneapolis, Minnesota.

[2]Marc W. Gold, "Research on the Vocational Habilitation of the Retarded: The Present, The Future" in International Review of Research in Mental Retardation, Vol. 6, ed. Norman R. Ellis, Academic Press, New York, 1973, pp. 108-109.

[3]Robert Sakata and Daniel Sinick, "Do Work Samples Work?" In Vocational Evaluation and Work Adjustment (A Book of Readings), eds. Ray Sankovsky, Gary Arthur, and Joe Mann, (Materials and Information Center Alabama Rehabilitation Media Service, Auburn, Ala.) p.92

[4]William M. Usdane, Workshops for the Disabled, A Vocational Rehabilitation Resource, quoted by Arthur D. Burdett, "An Examination of Selected Prevocational Techniques Utilized in Programs for the Mentally Retarded", Mental Retardation, (August, 1963) pp. 230-237.

[5]Sakata and Sinick, op. cit. p. 91

[6]Daniel Sinick, "Client Evaluation: Work Task Approach", In Vocational Evaluation and Work Adjustment (A Book of Readings), op. cit. p. 88.

(4) One report noted that prospective employers have been found generally more amenable to reports of work sample performance than to test scores or profiles. Demonstrated job potentials more readily lead to job placement.[1] Finally, (5) Work samples are somewhat better able to reveal not only skills required but also aspects of the client's personality, interest, motivation and attitudes toward work.[2]

The arguments presented against a heavy reliance upon work samples are: (1) The resemblance of work tasks to actual jobs is no assurance that performance on one will predict performance on the other. Jobs differ in many respects that cannot be duplicated in work samples.[3] (2) The resemblance of work samples to actual jobs may cause clients to believe they are truly being trained for such jobs. This can raise false hopes on one side and also cause clients to resist certain job samples because they resemble jobs they think they dislike.[4] (3) The behaviors and attitudes noted throughout the job sample are subject to the same subjective observation and interpretations by raters as are other types of rating scales. (4) Generally speaking, there is almost a complete lack of standardization of work samples. Most facilities which use work samples have devised their own based on jobs in their workshop or surrounding community and have not properly validated them.

In the general field of vocational evaluation of the handicapped, some efforts have been made to devise batteries of work samples which would have universal significance. The "TOWER" series and "JEVS System" are perhaps the best known.

Although a few of Philadelphia JEVS level IV tasks[5] and isolated portions of the TOWER could possibly produce valid data for TMR clients, most of the work samples in these two packages are inappropriate for this population.

The Wide Range Employment Sample Test (WREST), also titled the Jastak-King Work Samples is a recent development of J.F. Jastak and Dorothy E. King and is produced by Guidance Associates of Delaware. The normative data is sketchy, instructions are confusing and the set appears overpriced; however, the tasks involved can be accomplished by a significant percentage of TMR's and sheltered workshop norms are available. The battery is made up of ten basic tasks described as

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[1]Sakata and Sinick, op. cit.

[2]Usdane, op. cit.

[3]Sakata and Sinick, op. cit.

[4]Sinick, op. cit. p.89

[5]Jewish Employment and Vocational Service, Work-Sample Program Experimental and Demonstration Project, (Jewish Employment and Vocational Service, Philadelphia, 1968) p. 24.

follow: (1) Single, Double Folding, Pasting, Labeling and Stuffing, (2) Stapling, (3) Bottle Packaging, (4) Rice Measuring, (5) Screw Assembly, (6) Tag Stringing, (7) Swatch Pasting, (8) Collating, (9) Color and Shade Matching, (10) Pattern Matching.

The entire battery takes approximately one-and-a-half hours administration time and requires no academic skills on the part of the client.

A supplement manual to the WREST, published in 1973,[1] contains statistical data as well as the results of studies conducted on specific groups. One of these studies was conducted using a group of fifteen TMR students with the test administered three times at biweekly intervals in an effort to assess the results of repeated administrations. Average number of errors was 45.47 on the first administration, 40.40 on the second and 44.33 on the third. Although the authors suggest the test be used as a training tool, they acknowledge that the results of these retests certainly do not indicate startling improvement (or significant practice effect for that matter) and suggest that the test be administered six to ten times to produce significant results. They do not present data to support this suggestion. The authors also state that certain score levels attained on the first trial could be considered indicative of employability as could certain steady gains from the first through succeeding trials. Data are not given to substantiate these suggestions, however.

Norms are given for both competitive and sheltered groups. Workshop (sheltered) norms are based on 300 clients of the Opportunity Center, Inc., in Wilmington, Delaware. No description of this population is given except that the center is a "workshop for the mentally and physically handicapped"[2]. The authors describe their non-handicapped (competitive) sample "as a normal distribution taken from the general population using a test of 'general ability' (WRIPT).[3]

Norming and statistical treatments are open to serious question as are some of the sweeping statements made by the authors of the tests. Also, some of the instructions for administration are obscure and confusing. Despite the obvious shortcomings, the test battery appears to have potential for use with TMR groups.

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[1]J. F. Jastak, Wide Range Employment Sample Test, Supplement to Manual, (Guidance Associates of Delaware, Inc., Wilmington, Del.)

[2]The Jastak-King Work Samples Manual, (Guidance Associates of Delaware, Inc., Wilmington, Del., 1972) p. 5.

[3]Wide Range Intelligence And Personality Test (WRIPT) formerly known as the Jastak Test. Further details may be obtained from Guidance Associates of Delaware, Inc.

THE RATING SCALE

Vocational evaluation predictors can be expected to reach the greatest validity when they closely approximate both real work and a work setting. This philosophy has given birth to the 'situational evaluation'. Pruitt (1971) has defined situational assessment as follows: ".... systematic procedure for observing, recording, and interpreting work behavior.... applicable to a variety of real or simulated work situations, i.e., workshops, institutional job stations, work sample evaluation units, industrial evaluation job sites, or in simulated work situations."[1] The focus of a situational evaluation is not so much on skill-potential but on the 'general work personality'. "Can the potential worker work at all? Can he conform to customary work roles? Can he take supervision? Can he get along with his co-workers? Can he put in an ordinary working day? How does he respond to demands to increase his productivity or improve his quality? Does he work better alone or in the presence of others? Under what kind of supervision does he work most effectively? Does he get so preoccupied with quality that he cannot produce at acceptable rates, or does he try to work so fast that his quality suffers? What are his strengths and weaknesses as a worker?"[2] These questions become even more critical in the light of those studies which indicate that job success or failure frequently is not determined nearly as much by objective factors as by the supervisor's impression of the client.[3]

It is, of course, difficult if not impossible to accurately reproduce a job setting for evaluation purposes which completely approximates a competitive vocational situation. In most cases the best which can be accomplished realistically is the establishment of a quasi-industrial setting providing the simplest types of subcontract or prime manufacturing. This simple, industrial setting can, itself, have a definite negative effect upon higher level clients but apparently does not pose a serious problem at the TMR level.[4]

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[1]Pruitt, Situational Assessment: Principles and Process, quoted in Situational Assessment: Models for the Future, Dennis J. Dunn, ed. (Research and Training Center, University of Wisconsin - Stout, Menomonie, Wisconsin, 1973) p. 5

[2]Walter S. Neff, "Problems of Work Evaluation", Personnel and Guidance Journal, March 1966, Vol. XLIV, No. 7, pp. 682-688

[3]Donald W. Fiske, "Problems in Measuring Capacity and Performance", Proceedings of the Iowa Conference on Pre-Vocational Activities, John E. Muthard, ed., (Iowa City, 1960), p. 14

[4]Neff, "Problems of Work Evaluation", op. cit.

Assuming that an appropriate setting can be established, how does one assess performance in this type of evaluation setting? Production (quantity and quality) can be objectively measured with a minimum of difficulty but much more important in situational evaluation is the assessment of the client's response to a work environment, and work supervisory personnel's reaction to the client. The instrument used most frequently to record and interpret this information is a rating scale. The rater is asked to chart his or her assessment of the client's work readiness.

Dunn[1] states that behavior rating scales make two assumptions which lead to difficulty. The first assumption is that categories of behavior are defined in a way that can be rated on a continuous scale. This essentially means that if we define a category of behavior such as "relationship with supervisors" we have to come up with a way of scaling or rating client behavior on this category. This generally involves the setting up of some continuum of "behavior" ranging from poor to good. Some behaviors just do not lend themselves to this type of rating. Some behaviors are either present or absent, either acceptable or unacceptable with no grey areas in between.

Second, the rating scale can obscure situation-specific responses. For example, a certain worker's response to three supervisors might be "excellent", equal to and quantitatively scored as "one" on the scale. His response to the fourth supervisor might be rated "poor" which means a score of "nine". His average response to supervision then would be a three which completely obscures the significant conditions surrounding the behavior.

Recently, with the resurgence of the applications of "learning theory", more refined observational techniques have become available and the reader is directed to studies by Bijou, et al., 1968; Flanders, 1970; Peter, 1972; Tharp & Wetzel, 1969.

The use of rating scales to chart behavioral observations raises an interesting methodological question in regard to the present study. The attempt has been made to limit the scope of this survey to those studies involving TMR populations. Few rating scales have been researched specifically with this population, but should this preclude rating scales from consideration? The criteria of which behaviors are acceptable for employment would seem to be sufficiently universal to be required of all who are competitively employed. For this reason, an effort has been made to include significant research involving rating scales used for predicting employability.

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[1]Dennis J. Dunn, Situational Assessment: Models for the Future, op. cit. p.30

The Chicago Jewish Vocational Service[1] is often cited as a pioneer in the area of rating scale assessment of work behavior. Their Scale of Employability for Handicapped Persons is the product of a great deal of research spanning a period in excess of ten years. As initially researched, it involved a population of 1364 handicapped clients of four rehabilitation centers: Chicago Jewish Vocational Services, Indianapolis Goodwill Industries, Kansas City Rehabilitation Institute and Cincinnati Jewish Vocational Services. Although the information presently available pertaining to the study does not break the population down by IQ, it does appear that there were few if any TMR's served by Chicago JVS.[2]

The initial instrument included three scales. Counseling and Psychology Scales were filled out prior to the subject's entry into the workshop. The Workshop Scales were filled out after a two to four-week diagnostic period, midway through the workshop program, and at its conclusion. Basis for item selection on the scales was not specified in the available information. Scores were compared against three criteria of employment success: placement within three months, placement within one year, and maintenance of employment for those who were placed in the first three months.

Correlations between each of the three scales and the criteria of employment success varied from .13 to .49 (generally beyond the .01 level of confidence) but "moderate at best" (to quote the authors) so far as actual prediction is concerned. One reason posited for this was the moderate test-retest reliability (between .50 and .55). The authors suggested this was due to the high rate of staff turnover and the resultant difficulty of maintaining rater training at the Chicago JVS where the reliability studies were carried out.

Studies of each of the eighty-three items of the three scales correlating them with the three criteria of employment success produced individual items which correlated at a significant level with one or more of the criteria. These items were combined into clusters based on common factors which had already been isolated.

The significant clusters which emerged on the Workshop Scale were:

1. Attitudinal conformity to work role[a]
2. Speed of production[ab]
3. Maintenance of quality[abc]
4. Acceptance of work demands[abc]
5. Interpersonal security[ab]
6. Clerical ability[abc]

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[1]W. Gellman, D.J. Stern, and A. Soloff, A Scale of Employability for Handicapped Persons, (Jewish Vocational Service, Chicago, 1963). Also available in mimeographed summary.

[2]Ibid. p. 107

Counseling Scale:

1. Recent work history[a]
2. Appropriateness of job demands
3. Interpersonal competence[a]
4. Language facility
5. Prominence of handicap[a]
6. Ethnic and racial identity

Psychology:

1. Motor performance[c]
2. Ability to grasp instructions and persist in carrying them out in a reasonably efficient manner[c]
3. Ability to be involved in interpersonal relations

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a = significant for early placement - three months after the conclusion of the program
b = significant for placement within one year after conclusion of the program
c = significant for maintenance of employment after it is obtained.

Copies of the Workshop Scale and the Counseling Scale (1958 revision) were obtained from Chicago JVS in late 1973 (so it is assumed that they reflect the current versions of the scale). The Workshop Scale is comprised of fifty-two statements arranged under the following topical headings: "The Ability to Mobilize and Direct Energy in the Work Situation" (ten questions), includes complaints about self, eagerness to work, work drive, steadiness of work (at different task levels) odd or inappropriate behavior, willingness to work at unpleasant tasks. "Capacity to Tolerate and Cope with Work Pressures, Tensions, and Demands" (seven questions) includes punctuality, conformity to workshop rules, relations with foreman, complaints re: foreman, co-worker and tasks; acceptance of change. "Interpersonal Relations with Co-Workers and Foremen" (seventeen questions) involves social responsiveness, supervision required, effect of correction, effect of pressure, participation in group structures, communication with foremen, appropriateness of interrelations with foreman, acceptance of worker role, frequency and intensity of resistance and negative reaction to instructions, dependence upon foremen. "Functioning Level of Ability in Work Situation" (fourteen questions) concerns itself with response to mistakes, organization of work, comprehension of instructions, speed and accuracy at different levels, manual dexterity and limitations of handicap. "Overall Evaluation: Agency Criteria" is four summary questions concerning predicted placement, work competence, work personality and ability to maintain employment.

Following is an example taken from the first section of the scale:

5. Steadiness of work: more complex production task

X. Information not obtained: Task not assigned for reasons not related to the client's competence
Y. Task not assigned because it would be clearly beyond the client's competence
1. Very steady worker during entire daily work period
2. Reasonably steady worker during entire daily work period
3. Questionable or borderline steadiness during entire daily work period
4. Inadequate or unsatisfactory steadiness during entire daily work period.

Notice that different reasons for not obtaining the particular rating in question are taken into account. Unfortunately, many ambiguous terms are used such as "very steady", "reasonably steady", and "inadequate". Failing to provide objective criteria increases the probability of subjective ratings. Information on scoring was not included in the material provided by Chicago.

In 1970, Bolton of CJVS devised a revision of the Scale utilizing J.B. Taylor's method of scale construction. The result was an instrument composed of five continuum scales identified as follow: 1. Attitudinal Conformity to Work Role; 2. Maintenance of Quality; 3. Acceptance of Work Demands; 4. Interpersonal Security; 5. Speed of Production. Only the workshop scale was revised in this manner and the author stresses that this Revised Scale is not intended to replace the original instrument but might prove useful "for assessing overall client progress for research purposes."[1]

The authors view the original scale as being statistically significant but not sufficiently discriminative for individual prediction. The fact that research appears to be continuing on this scale would, however, produce the hope that the predictiveness of the scale will be improved.

The August 1972 issue of the Training School Bulletin contained an experimental edition of a rating scale developed by Lloyd K. Daniels of Central Connecticut State College.[2]

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[1]Ibid. pp. 12-13

[2]Lloyd K. Daniels, "An Experimental Edition of a Rating Scale of Vocational Adjustment for the Mentally Retarded", Training School Bulletin, (August, 1972) pp. 92-98

Rationale for the development of this scale centered upon the authors contention that available instruments on the work behavior of retardates offer "limited evidence of either validity or reliability and rarely lend themselves to convenient or accurate quantification.[1]

Development of the scale began with four hundred statements chosen from other rating scales. These were then screened for content validity by three judges, each professionals (post-Master Degree level) in the field of rehabilitation. Content validity was based on applicability to MR's, usefulness of the information contained and whether it described positive or negative behavior. Complete agreement was reached on one hundred twenty-seven items which comprised the scale with choice categories from "Usually" true through "Seldom" true with appropriate value weights. There was also an "Undecided" or "Uncertain" category with a neutral value. This scale was used on a sample group and an item analysis conducted upon the results. Ninety items were found to be significant at the .01 level and were selected for the Vocational Adjustment Rating Scale (VARS), forty-two reflective of positive vocational adjustment and forty-eight of negative. The vocational adjustment criteria used to validate the items were not indicated.

The scale was further broken down into those items judged (by three psychologists) to be directly related to work success and those items indirectly related to work success.

Reliability was ascertained by comparing scores of three raters who independently assessed each of a group of trainees. The raters received thorough instruction and practice in the use of the scale as well as having their attention called to the common types of rating errors such as "Halo" effect.[2] This was done in each of four job areas with reliability varying as follows:

Vocational Adjustment Measure	Training Department Grounds	Kitchen	Housekeeping	Retailing
VARS Direct	.97	.77	.88	.71
VARS Indirect	.88	.86	.96	.67
VARS Total	.92	.84	.95	.57
Trainees	12	12	11	5

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[1]Lloyd K. Daniels, James A. Stewart, "Development of a Vocational Adjustment Rating Scale for the Mentally Retarded", Training School Bulletin, (May 1971) p.10

[2]Lloyd Keith Daniels, The Relation Between the Self Concept, Perceived Parental Behavior, and Vocational Adjustment for Mentally Retarded Young Adults, (unpublished Doctor's dissertation, Boston University, 1969) pp. 76-77

The test population was composed of forty young adult males residing with their parents but enrolled in the North Reading Rehabilitation Center, North Reading, Massachusetts. Age range was 17 to 28 (mean=19.76), IQ (Stanford Binet) ranged from 50 to 80 with a mean of 64.53. The four training areas were selected because they contained sufficient staff to provide the necessary three raters.[1]

The basic weakness of the study is that it was merely a small part of a project designed to study the relationship between self-concept and vocational adjustment. For this reason the customary efforts to establish predictive validity for the scale were not carried out.

It is unfortunate in this regard that the 1972 Training School Bulletin article closes with the comment that the "list can be used... to enlighten... staff regarding the current and potential employability of mentally retarded trainees",[2] since these claims are not supported through research.

Some question could also be raised concerning the apparent practice of ascribing equal weights to items of unequal importance. In other words, in the scoring, a high rating on "Can Count" (Item 123) is just as significant as a high rating on "Accepts Supervision" (Item 77). It is noted in regard to the latter item, however, that there are several other items which deal with the same general area of acceptance of supervision thus "weighing" the factor to a certain extent.

The scale is not available in published form and its author recommends taking the material presented in the August 1972 issue of The Training School Bulletin (Daniels) and reconstructing the scale from it if exploration with the scale is desired. A letter from Dr. Daniels has indicated that several groups are using the scale for investigation of different populations so additional data may be forthcoming. Although the study has good design and face validity, statistical validity needs to be determined.

WORK HABITS SCALE (PORTION OF THE VOCATIONAL CAPACITY SCALE)
-MacDonald Training Center Foundation, Inc.
-Available From: MacDonald Training Center Foundation, Inc.
4424 Tampa Bay Blvd
Tampa, Florida 33624

The Work Habits Scale is one of the tests and scales which comprise the Vocational Capacity Scale developed at the MacDonald Training Center. The purpose of the entire project, known frequently as the

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[1]Ibid. pp. 48-49

[2]Daniels, "An Experimental Edition of a Rating Scale..." op. cit. p. 98

Ferguson-Pinkard project, was to "develop, validate, and standardize a vocational capacity scale which would assess the training assets, limitations and potential of young adults handicapped by mental retardation."[1] A discussion of the entire battery will be found in the section on COMPREHENSIVE TEST BATTERIES and will not be duplicated here. It should be noted that the authors do not encourage the use of individual portions of the VCS, such as the Work Habits Scale, as solo predictors.

Revision of the VCS in 1972 and subsequent validation indicate that the Work Habits Scale has the highest correlation with supervisor ratings of the final status of the clients of any of the portions of the VCS (.42).[2]

The Work Habits Scale consists of thirteen items under four general headings as follow:

LEARNING AND COMPREHENSION
1. Response to Instruction
2. Concentration
3. Adjustability to New Job Tasks

ATTITUDE TOWARD WORK
1. Adaptation to Work Environment
2. Motivation to Work
3. Reaction to Pressure
4. Punctuality
5. Work Interest

PERFORMANCE
1. Frustration Tolerance
2. Consistency of Effort

INTERPERSONAL RELATIONS
1. Reaction to Supervision
2. Cooperativeness with Supervisor
3. Relationship with Peers

Four descriptive statements are listed under each item. For example, the four listed under "Motivation to Work" are: 1. Usually looks for things to do; 2. Sometimes will look for things to do; 3. Rarely looks for something to do; 4. Constantly has to be pushed into doing something.

This item, as many others in the scale, uses the ambiguous terms "usually", "sometimes", etc. Supervisory opinion will vary as to what constitutes "sometimes" thus damaging the objectivity and reliability of the scale.

Total score on the scale is divided into quartile ranges and interpreted as follows:

Quartile 1	Day Care
Quartile 2	Sheltered
Quartile 3	Borderline
Quartile 4	Competitive

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[1]Cobb, Forecast of Fulfillment, op. cit. p. 73

[2]C.J. Ho, "A Validation Study of the Vocational Capacity Scale for the Mentally Retarded Young Adults", (MacDonald Training Center Foundation, Inc., Tampa, Florida, 1972) p. 3

Again, it should be remembered that the final quartile rankings are based on the combined scores of all the eight tests and scales which comprise the Vocational Competence Scale.

WORK ADJUSTMENT RATING FORM (WARF)[1]
-Bitter, James A. & Bolanovich, D.J.
-Availability: Printed in March 1970 AMJD.
Other availability unknown.

The Work Adjustment Rating Form (WARF) was designed to "predict job readiness of retardates." The authors desired more specifically, to design a tool which would provide (a) a systematic observation, (b) relevance, (c) reliability of observations and (d) identification of behavior patterns.

The study was conducted during 1964-1966 at the Work Experience Center, St. Louis Jewish Employment and Vocational Service. The conception of the form and the criteria used in its composition were not clarified in the AJMD article. Instead, the article is concerned with validation of the form on a population of forty clients in light of the four criteria mentioned above. Criteria for selection of the forty clients are also uncertain, however, the basic statistics for the group are as follows: mean age 19.41, range 15.92-19-83; mean IQ 59.25, range 39-84.

The forms were completed by three counselors and one foreman after both the third and sixteenth week of training.

The WARF contains eight scales, each broken down into five levels of performance. Performance levels are scaled so that a positive response at one level also should be counted as a positive response to levels below.

The eight subscales are: (a) Amount of Supervision Required, (b) Realism of Job Goals, (c) Teamwork, (d) Acceptance of Rules/ Authority, (e) Work Tolerance, (f) Perseverance in Work, (g) Extent Client Seeks Assistance, and (h) Importance Attached to Job Training.

The breakdown of one subscale was also included in the article. Under "Amount of Supervision Required" the following five levels are listed: 1. Client works with difficulty, even under constant supervision and after getting considerable training. 2. Client can work on his own after thorough training, if his work is frequently observed and checked. 3. With training and direction, client can work independently under occasional supervision. 4. Once shown what he must do, client applies himself diligently without much supervision.

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[1]James A. Bitter and D.J. Bolanovich, "WARF: A Scale for Measuring Job Readiness Behaviors", American Journal of Mental Deficiency, (March 1970), Vol. 74, No. 5, pp. 616-622.

5. Client catches on easily and does his work with practically no supervision. When these items are presented, they are presented in scrambled order and the level and scale of items are not known by raters.

Correlations were run between counselor ratings, after both three and sixteen weeks, and job success. Correlations were also run involving one counselor and the foreman (the only two for whom sufficient data existed) pertaining to each subscale of the test and eventual job success. Job success was measured as six months of community employment following the 36-week St. Louis JEVS training program.

In general, the WARF ratings (rank order) corresponded to the counselor's pooled judgment of employability at the end of the thirty-six week training period, and actual job success as determined by six months employment. These correlations, broken down for each subscale, are noted below.

	Criterion			
	Job Success		Pooled Judgment	
Subscale	Counselor A	Foreman	Counselor A	Foreman
Amount of Supervision	.57	.51	.78	.58
Realism of Job Goals	.67	.52	.90	.63
Teamwork	.16	.50	.47	.53
Acceptance of Rules	.35	.10	.57	.15
Work Tolerance	.26	-.04	.48	-.04
Perseverance in Work	.60	.65	.81	.70
Extent Client Seeks Assistance	-.34	.46	-.34	.47
Importance Attached to Job Training	.69	.70	.47	.76

Actual statistical significance of these phi correlations cannot be determined with the available data.

Although this is listed as a forty point rating scale, it actually has the effect of only an eight point scale since the questions are grouped as five levels under each of eight questions. It would appear that this would severely limit the reliability of the scale by insufficiently sampling each behavior area.[1] The format of the WARF also gives equal weight to each of the eight scales. In light of the results of the study, especially as recorded on the table, a weighed version of the scale might be in order.

A biserial correlation was computed between counselor ratings at the end of three and sixteen weeks and job success. Three of these reflected some increase in positive correlation, one reflected some

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[1]Victor H. Noll, Dale P. Scannell, Introduction to Educational Measurement, Third Edition, (Houghton Mifflin, Boston, 1972) p. 145

decrease in positive correlation. Significant differences in the number of clients tested at each time by each rater make the correlations relatively useless for determining the extent to which the additional thirteen weeks of evaluation improved prediction.

This is the shortest of the rating scales reviewed. According to the authors it can be administered in three to seven minutes and scored in five.

The authors cite as the primary needs for further research: identification of specific behaviors, attainment of observer consistency, and the development of normative information relative to predictive behaviors.

SAN FRANCISCO VOCATIONAL COMPETENCY SCALE
-Levine, Samual & Elzey, Freeman F.
San Francisco State College
-Availability: The Psychological Corporation
New York, N.Y.

The SFVCS was developed as an assessment tool for describing the vocational competence of mentally retarded adults. The authors picture it as useful in selection for training, assessment of status at a given time, judgment of growth over a period of time, and screening for placement.[1]

The scale contains thirty items each followed by four or five descriptive statements representing varying degrees of competence. The levels are meant to be cumulative in that a high level presumes competence on preceding levels. The items relate to: vocational competence - motor skills, cognition, responsibility, and social-emotional behavior.

The scale was developed around responses to questionnaires received from sixty-eight workshops containing mentally retarded populations. These were coupled with interviews and observations to determine those behaviors necessary to the development of vocational competence.

Two pretests, each involving 330 individuals, were conducted to produce the thirty items. These were then normed using a population of 562 mentally retarded individuals in forty-five workshops representing all geographic areas of the United States.

The thirty items on the test appear to have face validity so far as the purposes for which they were intended. Once again, however, many of the answers are in ambiguous terms such as "Hardly ever",

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[1]Samuel Levine & Freeman F. Elzey, Manual: San Francisco Vocational Competency Scale, (The Psychological Corporation, New York, 1968) p. 2

"Frequently", and "Occasionally". The procedures used for pretesting and norming the test appear appropriate. The only question which must be raised pertaining to the construction of the test is in the scoring. After each item has been scored (using the four or five descriptive phrases) the scores are added and averaged. The responses must be classed as an "ordinal" scale meaning that the relative distance between a 'one' and a 'two' may not be the same as between a 'two' and a 'three' and so forth. Therefore, the average of a one and a three might very well not equal a two. This makes it unwise to place too much weight upon a score which comes as the average of these ambiguous figures.[1]

N.M. Downie, in reviewing the SFVCS, calls it a "potentially useful scale" but stresses that "Follow-up studies should be made on those placed on jobs in the community".[2] Further studies will need to be made, at least on a local basis, before the Scale can be used for some of the purposes its authors propose. The only norms supplied in the manual (1968 edition) are percentile comparisons with the norming group of 562. This, of course, provides no real basis for selection for training or screening for placement. Although the Scale has use in test-retest situations, additional norms must be established to establish predictive validity.

VOCATIONAL ADJUSTMENT RATING SCALE FOR RETARDED[3]
-Song, R.H. & Song, A.Y.
-Availability unknown.

Song and Song list as the primary objective of their work "the development of a vocational adjustment scale to measure how a client actually performs and his specific behaviors in all types of work settings". Upon completion of the instrument it was used to test a primary hypothesis that retardates classified as better workers in scale ratings provided by work supervisors.

The test population was composed of 113 clients of the Rosewood State Hospital Vocational Rehabilitation Center in Owings Hills, Maryland. The IQ range of the population was from 36 to 76 with a median of 57. Client ages ranged from 15-44 with a median of 21.

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[1]R.J. Senter, Analysis of Data, (Scott, Foresman and Company, Glenview, Ill. 1969), p.11

[2]N.M. Downie, in The Seventh Mental Measurements Yearbook, Oscar Krisen Buros, Ed. (Gryphon Press, Highland Park, New Jersey, 1972) p. 1497.

[3]R.H. Song and A.Y. Song, "Development of a Vocational Adjustment Rating Scale for the Retarded", Journal of Counseling Psychology, 1971, Vol. 18, No. 2, pp. 173-176.

The scale is divided into five areas which are essentially based on the American Association of Mental Deficiency's study by Heber of important behavior variables of retardates.

The five areas and the number of items under each are as follows: I. Work Ability (9); II. Work Habits (14); III. Withdrawn Behavior (9); IV. Aggressive Behavior (10); V. Bizarre Behaviors (10). Answers are recorded on a five point continuum ranging from "very poor" to "excellent" in Areas I and II and from "very often" to "never" in Areas III to V. Raters were asked to assess every item and no weighing of the items was done.

Reference point for the scales was what the authors termed the "average worker" in a particular work setting. No mention was made of the criteria used to define or determine the average worker.

The validity criterion used was independent classification of the workers as 'excellent', 'good', 'fair', 'poor', and 'very poor'. This, apparently was done by the same supervisory personnel who had completed the rating scale and therefore the results are possibly affected by 'contamination' or carryover. For this reason the high correlation achieved is suspect.

Forty-five of the test population were placed in community employment for a minimum of two weeks. At the end of this period their employers were asked to rate them on a continuum from 'very poor' to 'excellent'. Even after this short period of time, only scale number two (Work Habits) displayed predictive validity (r=.42). The authors blame this at least partially on differences in criteria between that of the workshop and that required ton the job.

Based on the material contained in the article the scale does appear to differentiate between two groups of workers within a sheltered setting but the actual predictive value appears quite limited.

Additional research, if and when available, may result in different conclusions.

T.M.R. PERFORMANCE PROFILE
for the Severely and Moderately Retarded
-Alfred J. DiNola, Bernard P. Kaminsky, Allan E. Sternfeld
-Available From: Reporting Service for Children
563 Westview Avenue
Ridgefield, New Jersey 07657

The T.M.R. Performance Profile is a rating scale which results in assessment in the areas of: Social Behavior, Self-Care, Communication, Basic Knowledge, Practical Skills and Body Usage. The Manual states that it was developed "by classroom teachers out of the problems and

needs of the classroom teacher" to ascertain present functioning of "severely and moderately retarded children and young adults".[1]

The profile resulting from the scale has not been compared to outcome criteria, although a "realistic goal" level is listed at the 'three' level. (Each scale runs from zero to four). Definition of 'realistic goal' and what it means in terms of such things as independent living and employability is not discussed. Other than implying that some goal has been reached at level three, the profile is consistent in its expressed aim of only evaluating the pupil's performance against his own prior achievement.

The scale is comprehensive in the variety of traits which it records and it contains a great number of items which would relate either directly or indirectly to employability. Examples of employment-related items are: "Stability", "Response to Authority Figure", "Response to Criticism", and "Change in Routine" under the "Social Behavior" section; numerous questions pertaining to use of various tools under "Practical Skills", and an entire section on "Vocational Readiness".

It would appear, therefore, that with sufficient research and validation this scale could be developed into a predictive tool for employability in either sheltered or competitive settings. If this type of research is attempted, appropriate statistical studies should accompany it to determine which factors have no bearing on employability and which, if any, should receive additional weighting in the scoring.

Some items appear, in almost identical form, in more than one area thus "weighting" the item in relative importance. Nowhere do the authors indicate whether this is intentional or whether it adversely affects the validity of the test.

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[1]DiNola, Kaminsky and Sternfeld, "T.M.R. Performance Profile for the Severely and Moderately Retarded: Teacher's Manual" (Educational Performance Associates, Ridgefield, N.J. 1968) p. iii

COMPREHENSIVE TEST BATTERIES

There have been several efforts in the field of work evaluation of the retarded to produce batteries of tests which assess the performance of clients on a variety of tests and scales and then combine these results into a single predictive score or profile. Although the majority of work has been undertaken with EMR or mildly retarded populations, there are at least two studies where evidence has been presented to validate these methods with TMR populations.

VOCATIONAL CAPACITY SCALE[1]

-MacDonald Training Center
-Available from: MacDonald Training Center
4424 Tampa Bay Blvd.
Tampa, Florida 33614

The Vocational Capacity Scale (VCS) was not constructed using a TMR population. However, the subsequent follow-up by Maurice Dayan at the Pinecrest State School, Pineville, La., utilized a substantially TMR group.[2]

The Vocational Capacity Scale is essentially the development of Ferguson and Pinkard and reflects a more or less continual project beginning in 1959.

As initially designed, the VCS was comprised of eight measures described as follow:[3] (A) Work Habits - A rating scale, developed and standardized at the MacDonald Training Center Sheltered Workshop. (This is discussed separately in the chapter on Rating Scales.) (B) Physical Capacity - An adaptation of a scale taken from "Estimates of Worker Trait Requirements for 4,000 Jobs" (U.S. Department of Labor, Bureau of Employment Security, United States Employment Service - U.S. Department of Labor, 1958). (C) The Vineland Social Maturity Scale. (D) General Health - A rating form developed and standardized at the MacDonald Training Center. (E) Manual Skills - Derived from "The Pennsylvania Bi-Manual Worksample." (See description in appendix).

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[1]MacDonald Training Center, Predicting Vocational Capacity of Retarded Young Adults, (MacDonald Center, Tampa, Florida 1963).

[2]Maurice Dayan, Validation of the Vocational Capacity Scale Utilizing Institutionalized Retardates (unpublished research project, Training and Research Department, Pinecrest State School, Pineville, Louisiana, 1968). Microfiche: ED028552.

[3]MacDonald Training Center, "Vocational Capacity Scale", (MacDonald Training Center, Tampa, Florida, 1963) pp. 11-13.

Only the Assembly phase of this test is used. (F) Arithmetic - This factor is derived from the arithmetic portion of the Wide Range Achievement Test. (G) Motivation - Disc Assembly Test, an unpublished measure of motivation and sustained interest developed at the MacDonald Training Center. (H) Direction Following - Wells Concrete Direction Test. This test presently is not published.

Subsequent research by Ho[1] revealed that physical capacity, general health, and motivation, as administered in the VCS were not significantly predictive to warrant their continued inclusion.

The test is used to predict various levels of vocational potential of the retarded. The potential was seen in terms of three criterion groups: Competitive Employed, Sheltered, and Work Activity. The Competitive Employed Group was defined as those who had obtained and held competitive employment for a period of more than six months. The Sheltered Group consisted of those who had not achieved competitive employment after a period of nine months in a sheltered workshop. However, they were functioning adequately in a sheltered work situation. The Work Activity Group consisted of those who, following evaluation and training over a nine month period, had not been able to maintain the standards required for sheltered employment and had been dropped from consideration of candidacy for apprenticeship in the sheltered workshop.[2] (MacDonald also established a "Borderline" group between sheltered and competitive. This was the result of overlap in the VCS scores of the two groups.)

Because of the EMR population of the MacDonald Center it is not necessary to enter into a detailed description of the norming and validation work which was done as part of the original project. Several authorities in the field have looked at the project in depth and serious questions have been raised concerning some of the procedures involved.

Windle in his review of literature in the field[3] states that the MacDonald study has such serious methodological shortcomings that it is worthless as a predictive study. He notes in particular: "Criteria of vocational success, actual level of operating efficiency, was defined by the placement of the client within or outside the shop. The grounds for placement may not be independent of the descriptive characteristics of the client and therefore retrospectively related to placement." What Windle identifies is what is frequently described as a "self-fulfilling prophecy". In its most obvious form this would entail placing a client at a certain level due to his performance on

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[1]C.J. Ho, op. cit.

[2]Dayan, op. cit. p. 2

[3]C.D. Windle, "Prognosis of Mental Subnormals", American Journal of Mental Deficiency, Monograph Supplement, 1962, pp. 190f

a test battery and then using the placement to establish the validity of the test battery with no consideration as to whether the client might have performed even better at some other level. Windle also objects to Ferguson's use of Chi squares with the unequally sized groups used in the study. He states that these resulted in low expected figures in too high a proportion of cells for the statistical test to be meaningful. Windle also notes that some computations are incorrect.

The Dayan project, released in 1968, was a three year project aimed at validating the Vocational Competency Scale using a population of mentally retarded young adults in a residential institution. The age range of the population was similar (15-30 for the Pinecrest sample vs. 16-30 for the MacDonald sample). A rough estimate of the mean IQ of the Pinecrest study, based on available information would be 44. Mean for the MacDonald study (full scale WAIS) was 66.36.[1]

The three hundred and sixty-six residents involved in the Pinecrest study were each administered the VCS twice, one year apart. Administration of four of the scale items was done by three college students trained for that task. The Social Maturity measure was administered by the executive assistant of the project staff, the work habits ratings were completed independently by three staff members (usually cottage parents and the resident's supervisor) as was the physical capacity scale. The general health form was based on information from a cottage parent, a work supervisor and a staff physician.

Following the administration of the test items, the clients were involved (or continued to be involved) in the various programs of the facility. Judging from inferences in the Dayan report and the care taken to avoid contamination, the VCS scores were not used in making program determinations. If this is the case, the main objection to the MacDonald study was avoided.

During the two years following the initial testing, a social worker collected data on the movement of all subjects within and outside the institution. Six months prior to termination of the research project, upon careful analysis of client movement and performance in various programs, subjects were assigned to one of the three criterion groups.

Findings of the project are presented as follows:

DETAILED DESCRIPTION OF EACH CRITERION GROUP
SAMPLE BY: AGE, IQ, SEX, AND RACE (N=322)

		Competitively Employed	Sheltered	Day Care
Number (N):		20 (6%)	239 (74%)	63 (19%)
AGE:	Mean	21.14	22.19	20.13
	SD	2.78	4.24	5.05
	Range	15.3-25.8	15.0-30.6	15.0-30.1

[1]MacDonald Training Center, "Vocational Capacity Scale", op. cit. p4

DETAILED DESCRIPTION OF EACH CRITERION GROUP
SAMPLE BY: AGE, IQ, SEX, AND RACE (N=322)
(Continued from preceding page)

		Competitively Employed	Sheltered	Day Care
IQ:	Mean	62.8	42.65	33.76
	SD	23.19	14.28	8.1
	Range	32-80	12-98	25-58
SEX:	Male	17 (9%)	134 (72%)	36 (19%)
	Female	3 (2%)	105 (77%)	27 (20%)
RACE:	White	19 (7%)	184 (72%)	51 (20%)
	Negro	1 (1%)	55 (80%)	12 (17%)

Dayan indicates that the significant findings revealed by this table are as follow: First: There is apparently little or no difference according to age. This is not surprising due to the range limits imposed by the construction of the study. Second: There is some relationship between IQ and level of employment. The fact that significant variability was found in the competitively employed group Dayan interprets to mean that other factors beside IQ contribute to competitive employment potential. Third: Disproportionate percentages of females and negroes were found in the competitively employed group.

Comparisons were also done between the mean scores of each VCS measure and the various criterion groups. The differences were all found to be in the same direction; the competitively employed had the best scores, then the sheltered shop group, and then the non-employed, day care group. The only exception was General Health. Physical Capacity was also found to be a weak measure. It reached the .01 level of significance between the competitive and non-employed, but only .05 between sheltered and non-employed. The difference between competitive and sheltered was not significant.

As noted, all other comparisons showed mean differences which reached .01 or better.

COMPARISON OF EACH VCS MEASURE WITH
THREE CRITERION GROUPS MEAN SCORE

	A Competitively Employed (N=20)		B Sheltered Employed (N=239)[a]		C Non-Employed (N=61)[b]		T-ratios and Significance Levels		
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	A-C	A-B	B-C
WH	20.90	4.63	28.34	7.69	37.49	9.73	10.09*	6.34*	6.77*
PC	15.48	.77	13.44	2.51	10.59	3.13	3.79*	.85	2.36**
SM	83.15	6.21	71.83	8.37	58.90	8.38	13.55*	7.42*	10.69*
GH	3.77	.33	3.31	.68	2.53	.83	1.15	.53	.72
MS	404.80	60.42	846.79	473.93	1579.06	610.43	13.30*	13.03*	7.91
AA	3.27	.99	1.70	1.24	.75	.87	9.97*	6.53*	6.85*
DA	48.30	11.20	28.34	13.79	13.21	9.09	12.24*	7.30*	9.74*
DF	31.60	14.74	12.96	13.92	1.66	6.20	8.60*	5.32*	9.26*

[a]Exceptions are: MS=235, AA=238, DA=234
[b]Exceptions are: MS=50, DA=52, DF=58
*Significant beyond .01
**Significant beyond .05 but not reaching .01

WH = Work Habits
PC = Physical Capacity
SM = (Vineland) Social Maturity
GH = General Health
MS = Manual Skills
AA = Arithmetic
DA = Disc Assembly (Motivation)
DF = Direction Following

The author points out that Social Maturity (SM) was the strongest measure in differentiating between the competitively employed and the non-employed. Manual Skills (MS), Disc Assembly (DA) and Work Habits (WH) were also strong. Social Maturity also was the strongest measure when comparing the sheltered with the non-employed.

An analysis of factors measured by the VCS revealed that most of the measures were independent of each other. Direction Following was found to be related to Manual Skills and Arithmetic Achievement. Physical Capacity and General Health were related only to each other. The general factors which appeared to be reflected by the VCS were: non-intellectual routine work, intelligence, physical capacity-health, and social maturity.

Unlike the MacDonald study which resulted in a composite weighted score, Pineland used a standard score approach. Scores on each of the eight measures were converted to standard scores (z). It was found that there was no overlap of scores within one standard deviation of any mean. Using one standard deviation as a cutoff the VCS (in the Dayan study) would have predicted 85% of those competitively employed. The predictiveness of the total score as compared to individual predictors was not stated.

The VCS does appear to have definite predictive value. Since criteria both within sheltered facilities and communities vary, it is recommended by the authors that separate norms be established for each user.

Cobb, in calling attention to the fact that several of the scales used in the VCS are measures of functions subject to developmental and learning changes, suggests that its predictive value may well be much greater for short run than long run determinations.[1]

Further study, of course, would be in order. A significant starting point would be the work by C.J. Ho[2] and the subsequent revision of the VCS. The revision of this scale was announced by MacDonald in August of 1972 with the promise that a complete manual would follow.[3] The revised scale eliminated the Physical Capacity, General Health, and Disc Assembly, and experimentally replaced them with the Crawford Dexterity Test, Pictorial Interest Test and a Motivation Test devised by the staff psychologist. Quartile Scores were retained but revised weights were assigned to the components.

MCCARRON - DIAL WORK EVALUATION SYSTEM
-Lawrence T. McCarron & Jack G. Dial
-Available from: Indiana State University Bookstore
Terre Haute, Indiana 47809

A test battery still in the process of initial release is the McCarron-Dial Work Evaluation System devised by Lawrence T. McCarron, Department of Psychology, Indiana State University, and Jack G. Dial, Beaumont State Center for Human Development. The manual for the system is not yet available although rough drafts of chapters one and two were received for review. A limited number of kits containing the materials involved are available at $350.

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[1]Henry V. Cobb, The Forecast of Fulfillment, op, cit. p. 85

[2]C.J. Ho, op. cit.

[3]MacDonald Training Center, "Revision of the Vocational Capacity Scale" (MacDonald Training Center, Tampa, Florida 1972).

According to the authors the MDWES attempts to estimate two criteria: "general vocational competency, and specific task productivity." This is done by assessing five "predictive factors" through the use of both standard and specially contrived tests. The "Verbal-cognitive" factor is assessed through the use of the Wechsler Adult Intelligence Scale or the Stanford-Binet Intelligence Scale and the Peabody Picture Vocabulary Test. The "Sensory" factor is gathered from the Bender Visual Motor Gestalt Test and the Haptic Visual Discrimination Test. "Motor" ability is reflected by the "McCarron Assessment of Neuromuscular Development: Fine and Gross Motor Abilities" a battery of ten tasks, five assessing fine motor and five assessing gross motor skills. "Emotional" evaluation is taken from the "Observational Emotional Inventory" (McCarron and Dial, 1973) "an observational instrument to be used by work evaluators and supervisors in community sheltered workshops", according to the authors. The inventory attempts to assess "Neuropsychological-Impulsivity, Anxiety, Depression-Withdrawal, Socialization, and Self-concept".

"Integration and Coping" which appears to refer to the client's ability to function successfully in a work setting, is measured through the San Francisco Vocational Competence Scale and a Behavioral Rating Scale developed by Dial (1973).

Multiple regression formulas are used to predict work performance (equating the product of the formula to the scoring tables of the SFVCS) and work productivity (equated to the sample work task known as the "Fishing Tackle Assembly Task"). These formulas have been devised for abbreviated lists of predictors as well as the full battery and data are also cited for periods beyond one year post testing.

If the McCarron Dial System fulfills the claims of it's authors, it will indeed be a major contribution to the field of predictive vocational evaluation of all retarded.

Materials Development Center in reviewing the McCarron Dial System[1] calls attention to three weaknesses. First, all these tests must be individually administered, several by a trained psychologist. This is particularly unfortunate in that trained psychologists are not always easily accessible to work evaluation units. Second, although the authors state that performance and productivity scores reflect the individual's level of programming (day care, work activities, extended sheltered employment, transitional sheltered workshop employment and community employment) MDC notes that there are no placing cutoffs or guidelines. Hopefully, this matter will be clarified when chapter three of the MDWES manual is made available. Chapter three is said to contain a complete discussion of the vocational functioning levels.

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[1]Materials Development Center, slide-tape review of the McCarron-Dial Work Evaluation System, (Materials Development Center, University of Wisconsin - Stout, Menomonie, Wisconsin).

Third, Material Development complains that the research methodology is not clearly explained. The material received from the authors does not contain any data pertaining to the test populations used for norming purposes nor does it appear from the table of contents for the manual that a full report on this will be forthcoming.

At the very least the McCarron-Dial System must be viewed with some interest. Whether or not validation studies will reveal that it is indeed capable of fulfilling the goals set forth by the authors, must remain to be seen.

INTEREST TESTING

A number of studies on vocational placement of the retarded include a follow-up analysis of reasons for job failures. In most cases, provided that appropriate placement procedures have been used, the clients apparently were able to meet the skill and strength demands of the job. The majority of failures appeared to reflect difficulties pertaining to work interests, habits, motivation and understanding of job requirements (Abel, 1940; Michael-Smith, 1950; Martzler, 1951; Cohen, 1960; Windle, 1961).[1] For this reason, there has been steadily increasing concern shown in the area of vocational interest evaluation of the retarded.

The use of interest testing with the TMR has lagged behind for many of the same reasons as have other areas of vocational evaluation for the TMR. First, of course, until very recently, the TMR was not seriously considered for employment in a competitive or even sheltered situation. He was placed on the lowest level task available in the facility and any problems of work attitude or behavior were assumed to verify his unemployability.

Second, consideration must be given to the question of the effect of the TMR's lack of vocational exposure and retarded social maturity upon his vocational interests. If he has the aptitude for differential job placement, does he have enough exposure to job differences from which he can express a choice?

Third, few interest measures have existed which contained a significant number of occupations which could be seen as realistic goals for a TMR population.

With the increased interest in this population, however, some work has been done in the field. In an effort to assess the validity of occupational choices among various levels of MR populations, Cohen and Rusalem conducted a study utilizing three student populations: "normal", "non-institutionalized retardates" and "institutionalized retardates".[2]

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[1]Parnicky & Kahn, op. cit.

[2]Cohen and Rusalem, "Occupational Values of Retarded Students" American Journal of Mental Deficiency, July 1964, pp. 54-61.

Characteristics of the test population are charted below. Note that the institutionalized population has a mean IQ less than one standard deviation above the TMR range. The study is therefore included as giving some indication, at least in that segment, of the performance of a TMR population.

	Institutional (1)		Non-institutional (2)		Normal (3)	
	Mean	SD	Mean	SD	Mean	SD
AGE						
Boys	19.0	1.9	17.9	0.9	18.3	0.9
Girls	18.1	1.9	17.9	0.9	18.0	0.6
Total	18.7	1.9	17.9	0.9	18.1	0.7
FULL IQ						
Boys	62.1	14.9	68.7	12.8	97.1	21.0
Girls	60.1	9.9	74.8	12.5	101.5	15.9
Total	61.7	13.6	71.2	12.9	99.6	18.3

(1) Eighty-five secondary school age students attending the Edward R. Johnstone Training and Research Center, Bordentown, New Jersey. (It should be noted that clients are transferred to this institution from other institutions within the state because they demonstrate promise of benefiting from a specialized institutional rehabilitation program designed to return them to the community. Therefore, it is not a random population.)

(2) Ninety-two secondary school age students attending special classes for the mentally retarded maintained by the Trenton, N.J. public school system. Method of selection of this group was not noted.

(3) Ninety-nine secondary school students attending regular classes in the Trenton community.

Students were presented with nine occupational values: advancement, benefits, independence, interesting work, prestige, relations with others, salary, security, and working conditions. Each value was accompanied by a brief explanation keyed to the vocabulary and comprehension level of the two retarded groups. (The values were presented orally to the two retarded groups and in written form to the normal group.) The order of presentation of value choices was varied randomly. Each retarded student was asked to identify the most important occupational value. It was then marked "1" and the list read again omitting this item. This procedure was followed until all items were ranked. (Possible greater validity would have been obtained with retarded populations by subdividing the nine into smaller groups. Being faced with the necessity of making a choice from lists of seven, eight, or nine items could be expected to cause confusion and almost random choice responses from many MR's.)

The mean ranks for the nine items were computed both for the three major groups and for sub-groups of boys and girls. Based upon the mean

rankings, the nine values then were ranked from one to nine, with the highest ranked item being assigned first rank. Rank order correlations between the groups were obtained and tested for statistical significance. Results are listed below.

OCCUPATIONAL VALUE RANKINGS - BOYS

	Normal	Non-institutionalized Retarded	Institutionalized Retarded
"A chance to get ahead"	1	1.5	4.5
"Job I can enjoy"	2	7	4.5
"Steady work; sure of a job"	3	4	3
"Vacations, SS, Retirement"	4	1.5	1
"Good hours; pleasant surroundings"	5	3	6
"Highly paid job"	6	8	8
"Work with people I like"	7	5	2
"Job highly respected"	8	6	7
"Be my own boss"	9	9	9

OCCUPATIONAL VALUE RANKINGS - GIRLS

	Normal	Non-institutionalized Retarded	Institutionalized Retarded
"A chance to get ahead"	2	4	3
"Job I can enjoy"	1	2	1
"Steady work; sure of a job"	3	5	4
"Vacations, SS, Retirement"	7	7	7
"Good hours; pleasant surroundings"	4	1	5
"Highly paid job"	6	8	6
"Work with people I like"	5	3	1
"Job highly respected"	8	6	8
"Be my own boss"	9	9	9

Statistical significance of the results is as follows:

RANK ORDER CORRELATIONS AMONG RANKINGS OF OCCUPATIONAL VALUES BY SUB-GROUPS

	Rho	Significance at the 5% Level
Males		
Institutionalized retardates vs. non-institutionalized retardates	.70	P<.05
Institutionalized retardates vs. normals	.51	N.S.
Non-institutionalized retardates vs. normals	.60	N.S.
Females		
Institutionalized retardates vs. non-institutionalized retardates	.75	P<.05
Institutionalized retardates vs. normals	.83	P<.05
Non-institutionalized retardates vs. normals	.77	P<.05

	Rho	Significance at the 5% Level
Males vs. Females		
Institutionalized Retardates	.56	N.S.
Non-Institutionalized Retardates	.41	N.S.
Normals	.87	P<.05

The authors note with interest that there appears to be greater resemblance between sub-groups of girls within the study than between the sub-group of boys. "All groups consistently assigned low ranks to independence, prestige and salary. Both sexes placed high value on advancement suggesting that despite intellectual capacity, most of these students had expectations of achieving high-level vocational objectives." The authors suggest that the greater similarities between girl sub-groups may reflect greater similarities in perceived role between girls of various intellectual levels. "Consequently, vocational counseling of retarded girls may function on the assumption that these girls are seeking similar values from their work as non-retarded girls." On the other hand, counseling with retarded boys should be based on the assumption that this population places greater emphasis on job benefits and less upon relations with others and interesting work. "There is some reason to believe that retarded boys find it difficult to postpone satisfaction and need, in their work, immediate or early gratification."

Lacking in the study is any type of analysis reflecting the degree of unanimity within each sub-group. Sub-group means obtain significance only if there is significant agreement within the group. This has great importance when dealing with factors such as verbal explanations, where there is a great possibility of a lack of understanding. Without a measure of this type there is no indication that the test is actually a valid measurement of the attributes tested.

Whether or not the choices reflect legitimate, consistent interests has yet to be established. Particularly important would be similar studies of older age groups to find if interests expressed at the younger age level remain constant, even among normal populations. On the surface, at least to the authors of this article, the choices made by the testees appear to have validity.

In 1965 Billie W. Burg and Albert M. Barrett adapted an existing interest test so that it required no reading.[1]

The authors found in interest testing of retardates, especially within the moderate range, that (1) tests requiring even a minimum of reading ability were unrealistic, and (2) that even in picture tests, response was frequently to specific items within the picture rather than to the occupation which it illustrated.

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[1]Burg and Barrett, "Interest Testing with the Mentally Retarded - A Bi-sensory Approach", American Journal of Mental Deficiency, Vol. 69, No. 4. pp. 548-553.

In an effort to counteract this, the authors devised a set of verbal descriptions to accompany a standard interest test which was primarily pictorial with a minimum of verbal questioning. The test used was the Geist Picture Interest Inventory (GPII). In some cases the titles which Geist used were utilized, in other cases simplifications which were more descriptive were substituted.

Following is identification of the drawings on the GPII for males as devised by the authors:

TABLE I

Identifications of Drawings in the GPII

Booklet Page	Pictures 1	2	3
1.	Scientist	Worker on trees	Radio announcer*
2.	Actor*	English teacher*	Music conductor*
3.	Worker at blast furnace*	Arithmetic teacher	Business person
4.	Jar maker	Musician*	Doctor
5.	Worker pruning a tree*	Dentist*	Man adding on a machine
6.	Doctor	Welder*	Man who draws roads
7.	Singer*	President of the United States*	Baseball player*
8.	Musician*	Scientist	Librarian*
9.	Violin*	Plants	Arithmetic
10.	Ruins of Greece	Abstract art*	Man training dog*
11.	Jet pilots and plane*	Things left by people long ago	Settlement worker*
12.	House where they study the sun	Job counseling	Track*
13.	Musical instruments*	What a druggist uses	Pen and pencil set*
14.	Woodwork*	Throwing your voice	Photography*
15.	Music*	Acting	Art*
16.	Grocery store*	Corn field*	Paper mill*
17.	Politician*	Clothing sales person	Barber or beautician
18.	Newspaper man	Musician*	Policeman*
19.	Person who draws houses	Jewelry sales person	Animal doctor
20.	Acting*	Drawing clothes	Scout leader
21.	Speaker	Musician	Mailman*
22.	Person who hires people	Airport ticket taker*	Car salesman
23.	Air Force wings*	Graduation diploma	Movie Oscar*
24.	Art*	Dramatics*	Business*
25.	Musician*	Person who looks at the stars	Sign painter*

26.	Telephone lineman*	Judge*	Musician*
27.	Scientist*	Typist*	House decorator
28.	Grocery clerk*	Fisherman*	Druggist
29.	Salesman*	Farmer*	Bank teller*
30.	Magician*	Person who writes stories	Person who draws funny papers
31.	Lawyer*	Machinist*	Social science teacher*
32.	Playground director	Asking questions about families	Making designs on leather
33.	Statue	Chart made with arithmetic	Songs*
34.	Minister or priest	Appliance salesman*	Business man*
35.	George Washington crossing the Delaware	Drill press*	Weather map
36.	Blacksmith*	Shoe salesman*	Student*
37.	Filing cabinet*	Things used to draw plans	Paint set
38.	Modern dancing*	Hardware salesman*	Motion picture actor*
39.	Ballet dancer*	Statistician*	Choir singer*
40.	Adding machine	Saw*	Books*
41.	Actor*	Scientist	Musician*
42.	Draw houses	Puppetry*	Dancing*
43.	Movie directing*	Jonah and the Whale	Car engine
44.	Examine eyes	Adding machine	Insurance salesman*

*Geist's original identifications.

When Burg and Barrett's work was done, (1961) the Geist was available only for males. Research into the Geist test for females would, of course, be equally appropriate.

It was found that the test could be administered to groups of five clients at one time by having them seated in roughly the shape of a pentagon, all facing out, with the administrator in the center. Each client receiving the test is asked to identify the object on the front of the test booklet in order to assess his visual acuity. His ability to make the necessary identifications required regarding positions of pictures in the series is then assessed.

During the test administration, the examiner reads the questions on the page and describes each picture. He then repeats the question. The client is asked to indicate his preference by raising the appropriate number of fingers or pointing at his preference on the page.

At the time of publication of the findings, the validity of the bisensory form of administration of the Geist had not been established. Scores obtained from the retarded population were compared with Table 21 in the Geist manual which presents combined U.S. Mainland means and standard deviations together with those of the Hawaiian and Puerto Rican samples. A direct comparison of these scores indicated that the retarded sample obtained mean scores that exceeded the general population

in the areas of mechanical, clerical, outdoor, social service and dramatic. The authors do not draw specific conclusions from these findings but leave open the questions as to whether these results reflect basic, valid, interest patterns. They also suggest, especially in light of the fact that the sample was obtained from a single facility, the possibility of contamination of the sample by institutional training procedures.

This study poses interesting possibilities for further research. Would the results of this study (comparative means) be replicated in other programs? What about the Geist for females? Then, of course, the more general question of consistency, pertaining to all interest testing of those who have limited vocational exposure, must be raised - not merely with this study but the whole field as previously discussed.

There presently exist at least three non-verbal interest tests which could realistically be administered to TMR populations. These are the Vocational Interest and Sophistication Assessment (VISA), the Wide Range Interest and Opinion Test (WRIOT) and the California Picture Interest Inventory (PII). An effort has also been made to adapt the Geist Picture Interest Inventory (GPII) for administration to this population as mentioned earlier.

VOCATIONAL INTEREST AND SOPHISTICATION ASSESSMENT
-Parnicky & Kahn
-Present availability unknown. Developed at:
Edward R. Johnstone Training & Research Center
Bordentown, N.J. 08505

The Vocational Interest and Sophistication Assessment, originating as a part of the Johnstone Project described by Parnicky and Kahn (1963)[1], is included here despite the fact that it was designed for an EMR population. The VISA presents several unique features of design that would allow it to be adapted for use with the TMR population.

The interest portion of the original test consisted of a number of line drawings showing people working at various jobs usually considered as suitable for the retarded (although this assumption itself could be open to question). The drawings show males involved in the fields of construction-maintenance, farm-grounds, food service, garage, industrial and laundry. For females the choices are business-clerical, food service, housekeeping, industrial and laundry.

In the original form, care was taken to show the different job areas under different working conditions; e.g. the presence or absence of other workers and the presence or absence of supervision.

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[1]Parnicky & Kahn, op. cit. pp. 50-62, 153-164.

Follow-up studies of the original form indicated that these varying conditions appeared to have no discriminative bearing upon the choices.

The client is shown each drawing and asked if he would like to perform the work shown "a lot", "a little", or "not at all." The test administrator is warned to be watchful for response set and make every effort to counteract it. In this type of testing, clients apparently do have a tendency to consistently give the same response to all questions. Therefore, a forced choice format would offer certain advantages even though response set is still possible.

The "Sophistication" portion of the VISA consists of a series of questions which are asked before the interest portion of the test is presented. The questions are asked about pictures taken from the "interest" portion and assess the subject's knowledge of the jobs which are illustrated. "How much would a person make for doing the job," "What do you call a person who does this kind of work," "What other things would he have to do." The premise which appears to be operating here, is that for an individual's interests to have high validity the interests should reflect knowledge of the job area. Unless there has been a recent revision of the information used on the sophistication scale, however (the scale was designed in the early 1960's), it reflects a grossly unrealistic concept of pay received in certain job areas. It was noted in the report that an additional VRA grant had been applied for in 1963 (VRA Project 1221) in order to further develop the VISA. Results of this project are unknown. The scale presents an interesting approach in several ways.

1. It shows appropriate jobs in simple, line drawings.
2. It attempts to deal with the question of sophistication which, as yet, is a largely unknown variable.
3. It is administered orally and only simple responses are called for - client does not have to make choices between pictures.

The problems are as follow: and here again it must be stressed that only limited information was available plus what appeared to be an experimental version of the test.

1. There is a lack of data on reliability and validity.
2. The simple response format mentioned above presents a disadvantage. Many clients, seeking to give expected or acceptable responses, will say they like to do everything and not discriminate between jobs - a problem avoided in forced choice situations.
3. Some of the drawings are ambiguous both in regard to what the client is doing and which of the persons pictured the client is expected to relate to.
4. The sophistication element is largely an unknown. If valid, it would require constant updating to stay abreast of changes in the minimum wage law, etc. Indeed the effect of sophistication upon validity of choices is still not proven.

5. The question must be raised as to whether the test is excessively limiting in view of the small number of fields which are illustrated.

WIDE RANGE INTEREST-OPINION TEST (WRIOT)
-J.F. Jastak and S.R. Jastak
-Available from: 1526 Gilpin Avenue
Wilmington, Delaware

The WRIOT is a recently published picture interest test composed of 150 sets of three pictures each. The client is asked to record the pictures liked "most" and "least" in each set. Pictures contain both male and female figures and separate scoring guides are used for each sex. No reading is required on the part of the client and the responses can be recorded by either the client or the testor. The test was normed on a population of 951 which the authors say was representative of the general population. Norms were also drawn using tenth and eleventh grade high school students. Appropriateness of the test population is open to question because at least the adult population contained a high percentage of rehabilitation clients.[1] No norms are available for retarded populations but additional norms are promised in the near future. Test reliability is based on split-half coefficients using Cureton's formula and appears adequate.

Results are given as "T" scores in eighteen job cluster and interest areas including: Art, Drama, Sales, Management, Social Service, Number, Mechanics, Outdoor. Other scores are also given: Sedentariness, Risk, Ambition, Chosen Skill Level, Activity by Sex, Agreement (a measure of validity), and Interest Spread. Interpretation of significant scores is covered in the manual.

TMR clients occasionally require oral administration of the test with the testor recording scores. The test is rather long, especially for those with limited attention span. Valid test results have been obtained with TMR groups, however. Although additional research is needed to validate the test, it appears to be one of the more promising available interest tests at this point.

PICTURE INTEREST INVENTORY (PII)
-Kurt P. Weingarten
-Available from: California Test Bureau/McGraw Hill
Del Monte Research Park
Monterey, California 93940

The PII is composed of two parts. Part one contains fifty-three groups of three-picture-sets, from which each client is asked to pick

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[1] Jastak and Jastak, WRIOT Manual, (Guidance Associates of Delaware, Wilmington, 1972) p. 9

the one he likes most and the one he likes least. Part two contains thirty illustrations and the examinee is merely asked to state whether he likes or dislikes each. No reading is required and the test may be administered orally.

Although the test is non-verbal, there is almost a complete lack of representation of those job areas where illiterates can perform satisfactorily. With the exception of groundskeeping there are no pictures related to janitorial tasks, and none which would be identified as routine factory work.

This test apparently has not been revised since its initial release (1958) and as a result some of the pictures used are beginning to appear dated. This is mostly apparent in the props used in the pictures, the dress of the figures, and the lack of pictures applicable to some current fields. Also, although the test can be used for both sexes, all pictures are of male figures. This may prove confusing and disturbing to female examinees.[1]

The tests were normed on 1000 junior and senior high school students in sixteen states. No data was included to verify whether or not this was a representative sample of the total high school population and no adult populations were used.

Answers are computed in terms of percentiles on six "Fields of Interest" scales: Interpersonal, Natural, Mechanical, Business, Esthetic and Scientific. There are also three supplementary scales: Verbal, Computational, and Time Perspective (interest in jobs requiring a period of time or training for the attainment of proficiency). Although the manual contains correlations between the scales and scores for individual occupations, the testor usually must make his vocational decisions based upon the general scales.

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[1]Karl F. Botterbusch, Tests and Measurements for Vocational Evaluators, (Materials Development Center, Menomonie, Wisconsin 1973) p. 49.

THE TMR AS A WORKER

In the course of the survey, information frequently comes to light which is not directly related to the subject at hand but which would still provide useful information for those interested in the field. The following are four such articles which are not specifically about prediction of employability. They would, however, be of value and interest to anyone involved in vocational evaluation of the TMR.

The first study is by Lloyd Meadow and Eugene Greenspan (1961) at the Jewish Vocational Service and the Community Workshop in cooperation with the Detroit Association for Retarded Children.[1] The test population was identified as being composed of young adults of "working age" (19-31) with IQ's ranging from 47 to 60 with a Mean of 53. The test population was extremely small (N=10) and was atypical in the sense that it was composed of young adults who were considered most feasible for a rehabilitation program although none had a previous work experience.

The purpose of the study was to test the effect of work exposure, in this case sub-contract work in a sheltered shop, upon the functioning level of a retarded population.

The clients were first given a battery of tests including psychological and dexterity tests (WISC, MRMT, O'Connor Finger and Tweezer Tests, WRAT spelling, reading and arithmetic). Work behaviors during testing were also noted. Clients were then placed in the workshop on a variety of sub-contracts including hand assembly, light packaging, mailing, and salvage. There was frequent interaction with Workshop counselors and the client was given more difficult jobs as his feelings about work became more secure.

Upon completion of a three month period the same battery of tests was repeated. Although there was a possibility of practice effect the results of the IQ test were unchanged. There was a slight improvement in the Minnesota and O'Connor tests (statistical significance not stated) but the scores remained well below those of the general population. The authors also stated that there was little change in basic personality and sighted a parallel with the study by Neff at the Jewish Vocational Service of Chicago.

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[1]Lloyd Meadow and Eugene Greenspan, "Employability of Lower Level Mental Retardates", American Journal of Mental Deficiency, Vol. 65, 5. (March 1961) pp. 623-628.

The generalized conclusions of the study as stated by the authors are as follow: The work performed appeared to be more meaningful to them than their previous social and recreational activities. Most of the retardates were extremely proud of their regular pay checks. The amounts they received did not seem as important as the fact that they were working for pay.... Knowledge that they were working on real jobs similar to those done in private industry appeared to be an important motivating factor."

At the conclusion of the study two of the ten clients were considered unsuitable for any kind of employment. Five of the clients made sufficient progress to be considered adequate for placement in a permanent sheltered workshop. The remaining three clients made the best adjustment and were thought to have some chance of adjusting to a regular job under ideal conditions.

The conclusions of the study are apparently based on observational assessment and would, of course, be subject to the subjective factors influencing such assessments.

If a generalization of the findings were to be made, despite the small test sample and the ambiguous assessment methods, it would be that apparently workshop exposure makes significant improvement in work attitudes and behaviors but has minimum effects upon basic functioning as measured by dexterity, IQ or personality tests. These results duplicate in general the findings of Shulman[1] with an EMR population of somewhat larger size. In this study, scores on the WISC, Purdue, Vineland, Production (day-to-day and week averages as percentages of expected adult output), and Self-Concept (based on Guthrie, 1961[2]) remained stable on or near the estimated reliability of the instruments. Work Ratings (diagnostic scale reflecting work-relevant behavior) did not reflect this stability. From year one of the project to year three the stability coefficient was only .36. Shulman feels this merely means that work ratings are more a function of learning and adaptation than of maturation. The .36 may also indicate inherent weaknesses of the scale. That is, the individuals really didn't change - the test simply has poor reliability as an instrument.

A study related in a number of ways to the preceeding one was done by Jack Tobias and Jack Gorelick.[3] The problems selected for

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[1]Lee S. Shulman, The Vocational Development of Mentally Handicapped Adolescents: An Experimental and Longitudinal Study, (Educational Publication Services, Michigan State University, E. Lansing, Michigan, 1967).

[2]G.M. Guthrie, "Patterns of self-attitudes of retardates", American Journal of Mental Deficiency, (January, 1961).

[3]Jack Tobias and Jack Gorelick, "Work Characteristics of Retarded Adults at Trainable Levels", op. cit. pp. 338-344.

investigation in this study were as follow: (1) The relationship of productivity to IQ within the restricted range of the Day Center population. (2) The effect of continued practice on productivity. (3) The effect of deferred monetary incentives on production rates. (4) The effect of fatigue on productivity. This factor was also considered to be a measure of 'work tolerance'. (5) The effect on productivity of a long interruption of the task (a measure of retention). (6) An examination of the characteristics of identifiable trainees for whom even limited production activities were unsuitable. (7) An examination of production records of a Mongoloid group with an intellectually equated non-Mongoloid group.

Population for the study was the entire client body (N=60) of the Occupation Day Center in New York. It was in many ways a specialized population because it was composed of those judged "unsuitable for vocational rehabilitation" (terms in quotation marks are those of the authors but no explanation is given of the origin or determination of the unsuitability). IQ of the population ranged from fifteen to fifty-two with a Mean of 33.8. In age they ranged from 18 to 34 with a Mean of 24.16.

The procedure was as follows: Clients were trained in the disassembly of a nut, bolt and washer which were then placed in separate trays. After the task had been learned the clients were seated in groups of six and the following work schedule was followed (only one session was held on a given day):

Session I: Two hours of work
Session II: Two hours of work
Session III: Announcement of payment for work followed by two hours of work.
Session IV: Two hours of work, lunch, and two more hours of work. They were also reminded of payment based on productivity.

An interval of one month passed and then followed:

Session V: Two hours of work
Session VI: Two hours of work

Results from the sessions were noted for three separate sub-groups.

Group 1 whose IQ's ranged from 40 to 50.
Group 2 whose IQ's ranged from 30 to 39.
Group 3 whose IQ's ranged from 20 to 29.

The relationship between the average hourly production for the three groups is as follows:

	Average Hourly Production	Standard Deviation
Group I	358.9	90.5
Group II	250.1	78.7
Group III	161.7	78.1

Significance of difference between means:

Between Group I and Group II	+3.67	Significance: .001
Between Group II and Group III	+2.24	Significance: .05

Although it would have helped considerably had production scores of higher level retardate groups and non-handicapped populations been available for comparison, this study does appear to indicate a relationship between intelligence test scores and the number of units produced per hour. Interestingly, groups one and two reached peak production during the fifth session, that which immediately followed the one month layoff, while group three reached its peak during session four. Only group three showed a decrease in production following the one month layoff. Increases in production from the beginning to the end of the project were not considered significant and could have been the result of chance. In other words, there is again no significant increase coming as the result of practice or learning.

There was a slight increase in the first hour after the announcement was made regarding payment, but this was not maintained.

In the third and fourth hours of production on a single day (session four), group one showed an insignificant increase, group two a slight decrease and group three a more pronounced decrease. Apparently fatigue and boredom appear most significant at the lowest end of the IQ range sampled in this study and are insignificant at the top of the range.

Although they remained at the work tables throughout the study, six of the subjects failed to learn the task and were non-productive throughout. These six had IQ's ranging from fifteen to twenty. This resulted in speculation by the authors that twenty, or a mental age of three, might begin to constitute a border below which productive activity becomes unrealistic.

Fifteen of the test subjects were diagnosed as Mongoloid. When they were matched with fifteen other clients of similar IQ and age, their hourly production rates were found to be significantly lower:

Mongoloid average units per hour	275.5
Non-Mongoloid average units per hour	333.2
Difference between groups	57.7
-significant at the .05 level of confidence	

Much caution must be exercised in accepting as generalizations the broad conclusions reached from this study. Especially when broken down into subgroups the population numbers involved in the study are extremely small and, of course, reflect only one population. Once again the question must be raised regarding the selection of the test population. Who decided that this group was "unsuited for vocational rehabilitation ? What would have been the results of the study it there had been no prior selection yet the same IQ range was examined? Did the test population itself feel that it was "unsuited"?

It would appear appropriate for additional studies to be made under similar conditions to verify or refute the far-reaching conclusions posited by the authors.

A more generalized but related study was conducted by Distefano, Ellis and Sloan[1] in 1958 in an effort to determine the relationship between motor proficiency and IQ. Although the intelligence statistics of the test population are given in terms of "mental age", computations involving the mental age mean and the chronological age mean would place the population within the range of this paper (see below).

DESCRIPTIVE STATISTICS ON POPULATION

	MA		CA		
	Range	Mean	Range	Mean	IQ
Males (N=40)	5.33-11.50	9.00	9.66-29.00	19.73	50
Females (N=36)	5.50-10.83	9.14	11.48-32.41	22.25	41

The test population is identified as "a fairly representative sample" (but actual methods of determining the sample were not identified) of the residents of the State Colony and Training School at Pineville, Louisiana. Five motor tests were administered: Lincoln-Oseretsky Motor Development Scale, Rail-Walking Test, Minnesota Rate of Manipulation Test, Hand-Steadiness Test, and Strength of Grip. These were administered in a single session but in varying order. All tests were administered by the same person.

The relationships between the test instruments and mental age are as follow:

CORRELATION BETWEEN TEST INSTRUMENT PERFORMANCE AND MENTAL AGE

	MA	
	Female	Male
Lincoln-Oseretsky	.58	.40
Rail-Walking	.32	.04
Minnesota Placing	.45	.41
Minnesota Turning	.37	.38
Hand-Steadiness	.05	.16
Strength of Grip	.26	.03

The authors are cautious in ascribing far-reaching significance to their study saying: "Perhaps the most important finding is that intelligence and motor proficiency as measured by these tests are positively related in mentally defective subjects whose CA is beyond that during which rapid development in motor and intellectual abilities usually occurs."

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[1]Michael K. Distefano, Jr., Norman R. Ellis, and William Sloan, "Motor Proficiency in Mental Defectives", Perceptual and Motor Skills, 1958, 8 pp. 231-234.

Discarded as an explanation of the correlations involving the Minnesota was the possibility, suggested by Batts, that directions were not comprehended. Since administration of the tests to a number of people in this range has revealed repeated difficulty with the instructions, the temptation remains to infer a relationship despite the feeling of the authors that there was none.

Various tests for significance revealed that although males were more proficient than females on all tests only the difference in rail-walking was statistically significant at .01. There was no significant difference by race and no significant relationship between Mental Age and Chronological Age. This supports the findings of others that dexterity matures at approximately fourteen years.[1]

In many ways the most unique of the three studies is another study by Tobias and Gorelick[2], this time involving a group from the AHRC Training Center and Sheltered Workshop in New York. The study concentrates on the tendency of some trainees to arrange and organize their completed work far beyond the requirements of the job, frequently taking excessive care to make neat piles and geometric arrangements even when such organization has no practical value. The authors undertook their study to provide answers to the following questions: 1. Is excessive orderliness a universal characteristic among retarded adults? 2. Is there a relationship between 'orderliness' and intelligence? 3. When 'orderliness' is demonstrated, does it have any significant effect on productivity?

The test population was composed of sixty mentally retarded adults (IQ range 26-75) who were trainees of the above named workshop. The population was accustomed to frequent changes of job assignments.

The task required the assembly of four metal pieces to form a wire-clamp. Following initial instruction each client was given a metal tray containing hthe necessary parts. Under condition "A" the client was to put the completed parts on the table in front of him with complete freedom to arrange the parts as he saw fit. Under condition "B" each client was told to drop his finished parts in cardboard containers placed on the floor beside him, thus eliminating the temptation to handle them further. Each subject proceeded through two trials under each condition in either of the following routines: A-B-A-B or B-A-B-A. Extent of patterning under condition "A" was evaluated as follows: (1) Rigid Ordering: The subject's completed work exhibited some definite geometric arrangement (i.e. straight lines or all pieces facing same direction). (2) Vague Ordering: The existence of an

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[1]G.N. Cantor and C.M. Stacey, "Manipulative Dexterity in Mental Defectives", American Journal of Mental Deficiency, 1951, 56 pp. 401-410

[2]Jack Tobias and Jack Gorelick, "An Investigation of 'Orderliness' as a Characteristic of Mentally Retarded Adults", American Journal of Mental Deficiency, Vol. 64, No. 4, pp. 761-764.

unidentifiable or inconsistent pattern but not a haphazard arrangement. (3) Haphazard Arrangement: No tendency toward placing the work in any organized arrangement.

Slightly less than half the retarded adults in the Workshop manifested a definite tendency toward unnecessary organization and arrangement (Rigit Ordering). An additional group was cited as showing the same tendency but was "unable to maintain it because of short attention span and distractibility". It is assumed that this rationale for the discontinuation of the ordering is based on past experience with the clients although other motivation (such as increased interest in production) also might have precipitated the same results. The mean IQ for the "Rigid Ordering" group was found to be 51 and that of the "Haphazard" group was found to be 57 a figure statistically significant at the .02 level of confidence. IQ figures were not listed for the "Vague Ordering" group.

To determine if "Rigid Ordering" had an effect upon production the average hourly production of each of these trainees was compared under both conditions. No information is given to verify whether or not sufficient control of other variables was kept at this point (such as time of day of administration) to prevent contamination of the results.

Average hourly production of the "Rigid Ordering" group under condition "A" was recorded as 97.27; average production under condition "B" was recorded as 107.67. This would be statistically significant at better than the .01 level of confidence. The production of the "Haphazard" group was also noted under both conditions. The results were as follow: Condition "A": 112.02; Condition "B": 113.04. The difference is statistically insignificant but suggests that condition "B" is conducive to higher production irregardless of other factors. The increase is definitely within the "chance" range statistically.

The authors summarize their results as follows" "Retarded adults who exhibit a rigid orderliness in their work produce less than they are able. Their productivity rises as external conditions prevent this trait from operating." Although the presence of orderliness "is evident at all levels of retardation, the tendency becomes less pronounced as the scale of IQ's rises." "Even vague or inconsistent orderliness.... has a detrimental effect on productivity."

The authors see their study as having practical implications for workshop production, recommending that work should be arranged in such a way as to make spontaneous "ordering" impossible. The implication for work evaluation would be found in the identification of this trait in individual clients and an awareness of the implications which this would have in jobs where ordering would be possible. Yet to be explored are the more far-reaching questions as to whether or not "ordering" is an indicator of other non-productive behaviors and attitudes or whether it functions independently of other traits.

In the introduction to this paper reference was made to the study by Delp[1] carried on at the Training School - Vineland, N.J. It was the author's purpose to refute certain conceptions concerning necessary IQ levels for training or adequate functioning in different areas. To accomplish this Mr. Delp conducted a survey of the rather extensive facilities of The Training School and found that those 'successfully' carrying out certain jobs did have IQ's below that which was generally considered minimal. It is unlikely that the results can be accepted at face value. There would be every reason to suspect that the job demands would be vastly different between the competitive version of a job and that conducted in the sheltered confines of Vineland. Examples would be differences in supervisor expectations, increased structure (absenteeism can be controlled much more directly in an institution), actual simplification of job demands, and the different atmosphere of interpersonal relations between co-workers. Therefore, the IQ required to perform a task under the sheltered conditions Mr. Delp was observing might indeed be lower than the IQ required to perform a similar job in a non-sheltered setting.

For what it's worth, however, these are the jobs which Delp feels can be adequately performed by the TMR:

JOBS	IQ
Farm	
Picking chickens	30
Wheeling grain	30
Husking corn, washing vegetables	38
Picking apples	38
Thinning plants	38
Cleaning automatic water fountains - poultry	42
Feeding mash and grain	42
Setting onions	44
Cutting trees	44
Tractor plowing, etc.	51
Tractor seeding	52
Machine setting plants	52
Pruning fruit trees	52
Hand spraying	55
Greenhouse	
Cleaning greenhouse	42
Grounds	
Raking leaves	31
Hand mowing	31
Using sickle	34

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[1]Delp, op. cit.

Grounds - continued	
Repairing roads	40
Trimming lawn edges	40
Cleaning grass from flag stones	40
Laundry	
Pulling washers	26
Delivering to cottages	26
Operating extractor	37
Operating washer	37
Operating mangle	37
Sorting laundry by cottage	47
Ironing shirts	51
Dietary	
Cleaning root vegetables	36
Drawing and cleaning poultry	37
Cleaning stoves	44
Mopping floors, washing tables	44
Dishing food at stove	45
Operating potato peeler	45
Assisting at stove, cooking	53
Pantry	
Placing food on tables	30
Wet mopping floors	32
Washing dishes	47
Setting tables	47
Housekeeping	
Sweeping, dry scrubbing	32
Clean tub and toilet	34
Washing windows	40
Waxing floors and linoleum	42
Sorting and counting laundry	47
Assisting in clothes room	54
Carpentry	
Rough sanding, cleaning	53
Miscellaneous	
Pressing by hand, sewing room	40

The author notes that even these figures should not be considered rock bottom. They are merely reflective of the lowest IQ which had been successfully used on the job in that particular institution.

SUMMARY

The belated consideration of the TMR adult for competitive or sheltered employment as opposed to placement in an activities center has been seriously hampered by a lack of tools for conducting predictive work evaluation for this population. On a great many tests the TMR adult, due to lack of exposure and a slower learning rate, falls below the range within which the test is designed to differentiate. This unavailability of appropriate evaluation tools results in the TMR being assigned to (usually) the lowest level tasks within the facility, a decision based either on staff impression or reported IQ.

Research into the job skills of TMR's (Delp, 1957) and competitive job placements being recorded by vocational rehabilitation facilities indicate that the TMR is, in many cases, capable of sheltered or competitive employment. As the present study reveals, however, the discovery of this individual potential is left almost completely to chance.

Standardized tests of dexterity, perception and aptitude are of little use with the TMR. The only study found which used a single test for predictive purposes was a study (Tobias and Gorelick, 1960) which used performance on the Purdue Pegboard to predict performance on certain related sheltered workshop tasks. Also noted in the study was the apparent positive relationship between IQ and performance on the Purdue. This relationship was much higher between the Purdue and the Full Scale and Performance WAIS than between the Purdue and the Verbal WAIS.

Studies which attempted prediction based on batteries of standard tests followed the same pattern of seeking prediction for process rather than outcome purposes. In an effort to assess the appropriateness of this "stage-to-stage" prediction, the Johnstone Project (Parnicky, & Kahn) examined the relationship between initial evaluation and various phases of their vocational training program. The phases of the program at the Johnstone Center (residential) were: I. Eight week evaluation. II. One semester of half-time vocational training, III. Two or three semesters of full-time, normal work day, vocational training on campus. IV. Daywork in the community (no set length), and V. Community employment and residence. Results of the project indicated that the prevocational battery became increasingly less predictive through succeeding stages of the program and had virtually no predictiveness for the final community employment. The ratings by community employers seemed particularly inconsistent with any of the predictive tools.

A study conducted at Moose Jaw, Saskatchewan, (Elkins, 1967) used a battery of nineteen items including standard tests, personal information, and a rating scale, to study the ability of those items to predict

performance on four workshop tasks (color sort, form sort, simple five-piece assembly, combined cut-assemble operation). With the exception of the items of personal information, and the Peabody Picture Vocabulary Test, all of the predictor variables displayed a significant relationship to the work samples. Other than once again indicating that there is a "general ability" factor encompassing intellectual and psychomotor skills which is related to performance on certain types of job tasks, the study contributes little. The author does not follow through on his initial goal of predicting job success for this group even though a subsequent study (Elkins, 1968) explores this with an EMR group.

A somewhat similar study using some of the same instruments was conducted in Akron, Ohio by Edwin E. Wagner and Dennis A. Hawver (Wagner and Hawver, 1965). Here the results of the predictive battery were compared with rankings compiled by the chief instructor of the workshop. Even with the addition of behavioral criteria which were to be taken into consideration by the chief instructor, various dexterity tests (O'Connor Finger and Tweezer, MRMT Placing and Turning) were found to be significantly predictive of sheltered workshop performance. Unlike the published results of the Elkins study, however, the relationship was positive. To Wagner and Hawver, however, the greatest significance was found in a test not customarily administered in a work evaluation unit: "The correlations between the Bender Visual-Motor Gestalt rankings and the criterion rankings is exceptionally high and accounts for approximately 79% of the total variance. On the basis of the BG alone, it would be possible to predict rankings of workshop performance for these subjects with a high degree of accuracy."[1] Although the test population was quite limited in size and was observed only on benchwork and woodworking, the study once again appears to indicate the presence of a general ability factor which the authors call an "inactness" factor. No effort is made to generalize the predictive results of the tests used. The authors do not claim that these instruments will predict success in community employment.

The predictive ability of work samples in general remains in doubt primarily because of the lack of standardization of samples and the basic question of just how similar the responses to a sample are to those which will be elicited by actual work. Most of the traditional work-sample batteries such as TOWER require verbal comprehension in excess of that possessed by a TMR. A possible exception is the Wide Range Employment Sample Test by Jastak and King. The ten basic work tasks (similar to jobs found in both sheltered and competitive employment) require no reading and a minimal level of verbal comprehension. They have been normed on both handicapped and non-handicapped workers. Small populations of TMR students were involved in some of the norming. However, the statistical basis for the norms and the analysis of data appear open to question. Nevertheless, the battery appears to have potential use with TMR groups.

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[1]Wagner and Hawver, op. cit. p.689.

The rating scale is the evaluative tool used most frequently in a situational evaluation where the client's work and working conditions are constructed to approximate "real" work. Rating scales, despite their inherent weaknesses appear to be, presently, the best predictive tool for use with the TMR. This inference is based on the "track record" of rating scales used with other populations rather than on their use with TMR's.

Pioneer research in the use of the rating scale for predictive assessment was carried on by the Chicago Jewish Vocational Service (Gellman, Stern and Soloff, 1963). Chicago JVS initially designed three scales: Counseling, Psychology and Workshop. Although predictiveness was "moderate at best" (to quote the authors) three items, on the workshop scale were found to be significant for both placement and maintenance of employment: maintenance of quality, acceptance of work demands, and clerical ability. Each scale contained other items significant for either placement or employment maintenance.

Subjectivity of the Chicago JVS scale was increased by the use of many ambiguous terms, such as "very steady", or "inadequate", in the multiple-choice responses to each scale item. Research on the scale continues to become available. An example is the 1970 revision (Bolton, 1970) utilizing J.B. Taylor's method of scale construction.

Another rating scale upon which a significant amount of research has been done is the Work Habits Scale taken from the Vocational Capacity Scale of the MacDonald Training Center, Tampa, Florida (Ferguson-Pinkard, 1963). Since the WHS is part of a larger battery, the authors caution against using it by itself for predictive purposes. It has proven, however, to be the best single predictor within the VCS. The scale uses thirteen items to rate Learning and Comprehension, Performance, Attitude Toward Work, and Interpersonal Relations. Four descriptive statements are listed for each item but once again often in ambiguous terms.

Two rating scales which are available through customary sources are the "San Francisco Vocational Competency Scale" (Levine and Elzey, 1968) and the "T.M.R. Performance Profile" (DiNola, Kaminsky and Sternfeld, 1968). The San Francisco Scale was developed around responses to questionnaires received from sixty-eight workshops containing mentally retarded populations. These responses were coupled with interviews and observations to determine those behaviors necessary to the development of vocational competence. Due to the lack of validity data available on the test, it is suggested that it's use be limited to test-retest situations.

The T.M.R. Performance Profile attempts to rate all areas of the functioning of the trainable mentally retarded and is developed basically for classroom use. Many of the items and areas contained in the test would be useful in vocational evaluation. No effort has been made to use the test for predictive purposes. It is recommended by the authors only for periodic reassessment of individual progress.

The August, 1972, issue of the Training School Bulletin contains an experimental edition of a rating scale by Lloyd K. Daniels which was developed from a base of four hundred statements taken from other rating scales. The statements were screened by trained personnel in the field of rehabilitation. The items elected were actually never tested for validity since the scale was designed merely to provide a systematic mannor of reporting work adjustment data for use in a larger research project.

There have been at least two attempts to produce comprehensive batteries of tests for the predictive vocational assessment of the TMR. The first of these, the Vocational Capacity Scale (MacDonald Training Center) was developed on a handicapped population within the educable rather than trainable range. It was subsequently validated, however, (Dayan, 1968) on an institutional, TMR, population. Items in the present version of the VCS are: Work Habits Scale, Vineland Social Maturity Scale, Manual Skills (from the Pennsylvania Bi-Manual Work-sample), Arithmetic (possibly to be dropped in further revisions), and Direction Following (Wells Concrete Direction Test). This battery was used to predict the eventual vocational level which would be attained by the clients tested. Although the MacDonald project has been criticized for weaknesses in research design, the Dayan follow-up recorded even greater validity while avoiding the pitfalls in research.

The other battery which includes research with a TMR population is the McCarron-Dial Work Evaluation System still in the process of release through Indiana State University (Terre Haute, Indiana). This battery attempts to evaluate five predictive factors: Verbal-cognitive, Sensory, Motor, Emotional, and Integration and Coping. This evaluation is accomplished through a combination of standard tests, specially designed tasks, and rating scales.

Although the initial material on this battery is encouraging, sufficient information is not yet available to allow a true evaluation of the McCarron-Dial System.

Since a strong correlation exists between job satisfaction and success, and since there is evidence that TMR's are capable of demonstrating valid vocational preferences (Cohen and Rusalem, 1964), the interest tests suitable for use with a TMR population were explored.

There are presently three interest tests which are completely non-verbal: The Vocational Interest and Sophistication Assessment (VISA), The Wide Range Interest and Opinion Test (WRIOT), and the California Picture Interest Inventory (PII). There has also been an effort made to adapt the Geist Picture Interest Inventory (GPII) for a non-reading population.

The Vocational Interest and Sophistication Assessment (Parnicky and Kahn) is the only one of the tests designed specifically for use with a retarded population. As with the case of the other two non-verbal tests, all jobs are presented pictorially. Unlike the other tests, the VISA does not require the testee to chose between pictures

but to rank each picture as to whether he would like to do it "a lot", "a little" or "not at all". The pictures are simplified line drawings with extraneous detail excluded and the jobs pictured are those considered most readily available to the TMR. The VISA also contains a "sophistication" section in which the testee is asked questions designed to determine the amount of knowledge he possesses concerning the various job areas pictured. The premise is that for an individual's interests to have high validity, the interests should reflect knowledge of the job area.

The Wide Range Interest and Opinion Test and the California Picture Interest Inventory both present pictures in groups of three requiring the subject to chose which pictured activity he prefers. Of the two tests the WRIOT pictures a wider variety of activities, shows both sexes engaged in the work activities and appears to illustrate more contemporary work fields. Both tests contain a number of activities which would be unrealistic for the TMR. The WRIOT results in the greater amount of scoring information and includes an "Agreement" (validity)scale.

Burg and Barrett (1965) developed an administration of the Geist Picture Interest Inventory for males which required no reading on the part of the subject. In this oral administration the testor both read the sentences printed in the test booklet and described each of the pictures to assure that the activity was understood by the person taking the test.

In the course of the present research project several studies dealing with TMR populations came to light which did not fit within the stated boundries of the research. These were included because of the insights which they contained and their potential bearing upon predictive vocational assessment of the TMR.

A study was conducted in 1961 (Meadow and Greenspan) at the Jewish Vocational Service and the Community Workshop in Detroit to determine the effect of work exposure (sheltered) on a basically TMR population. The test battery was administered before and after a three month workshop exposure. The authors concluded that although there was no significant change in scores on the standard tests, there was an alteration in work attitude as a result of the exposure. The work itself appeared to be motivating and the resulting paychecks were a source of pride. The size of the paycheck did not seem as important to the clients as the fact they were working for pay. These results parallel those in a similar study done with an EMR population by Shulman (1967).

Effects of repeated work sessions and various motivators on a TMR population were explored by Tobias and Gorelick at the Occupation Day Center in New York.

Except for the lowest IQ group (20-29), a layoff of several weeks did not adversely affect production. In fact, within the 30-50 IQ range production reached its peak at the session immediately following the layoff. After an announcement was made concerning payment for the

work, there was a slight increase in productivity but only temporarily. Fatigue and boredom (caused by an extended session) resulted in a significant decrease only with the 20-29 IQ group.

There were six subjects who failed to learn the task and remained non-productive throughout the sessions. These all had IQ's between 15 and 20 causing the authors to speculate that an IQ of 20 might be a general cutoff for productive activity. The fifteen subjects diagnosed as mongoloid had hourly production figures lower than non-mongoloids of similar IQ and age.

Another study by Tobias and Gorelick (1960) concentrated on the tendency of some trainees to arrange and organize their completed work far beyond the requirements of the job. The study found that this was not a universal tendency among retarded, but it did occur more frequently among lower IQ groups and always had a negative effect upon production speed. This could be counteracted by arranging the work in such a way that ordering was impossible. It is also a trait which could be observed in an evaluation unit and seen as detrimental to high productivity.

CONCLUSIONS

The needs are apparent and immediate. Trainable mentally retarded adults are in residential institutions when they could be in their own communities. Some have been delegated to "activities" programs when they could be experiencing the accomplishment of productive labor. Others are restricted to sheltered facilities when they are capable of competitive employment.

An extensive review of the literature related to the predictive vocational assessment for the TMR adult indicates that consistently reliable and valid instruments do not presently exist.

It therefore becomes necessary, especially in the light of Ohio's increasing, appropriate concern for the "humanization" of all of its handicapped, for predictive tools to be developed, validated and made available to facilities throughout the State.

At this point, those existing tools which appear most promising are the comprehensive test batteries developed by the MacDonald Training Center and the McCarron-Dial System. The rationale for their selection is that evaluation needs to be of the whole person and not merely one facet such as productivity or work behavior. It should be noted, however, that neither of these batteries includes an assessment of interest. It is noteworthy that the Vocational Interest and Sophistication Assessment is part of a test battery developed at the Johnstone Training Center in New Jersey but not researched with a TMR population. This entire battery might realistically be examined for potential use with the TMR population.

In working with the Vocational Capacity Scale (MacDonald), various test instruments could be administered in parallel with or in place of those currently included in the scale to improve predictiveness. The MacDonald Center itself is following this procedure. The McCarron-Dial System should be used in its entirety to enable utilization of normative data currently being released. Further research and validation studies with this battery would be highly in order. An appropriate and practical concern with all the interest tests surveyed would be an assessment of the TMR's perception of the actual pictures presented. Perhaps the conceptions of the artist are not being conveyed and the client taking the test is either responding to secondary features in the picture, or misinterpreting what the worker is doing. Burg and Barrett presuppose this in their treatment of the Geist by verbally identifying the pictures. In the VISA the subject's understanding of the pictures is measured by means of the "Sophistication" portion. Apparently no effort has been made to evaluate the WRIOT or the CPII in this regard.

Further studies would also be appropriate regarding the real significance of the vocational choices of the TMR. Do these remain consistant? Are they realistic? Are the interests strong enough to provide goals worth working toward?

At least in theory, the single best predictive tool for vocational potential would appear to be some form of a rating scale. Although none of the existing instruments are sufficiently predictive to be used for individual prediction, they do provide a tool for frequent re-evaluation of progress by comparing the client with himself. It would appear that the predictability of these scales could be improved through the use of more precise and objective terminology. Here as in no other area of evaluation the subjectiveness and possible prejudices of the rater can influence the results when he is asked to provide assessment in terms of 'satisfactory', 'occasionally', etc.

The TMR Performance Profile is already gaining some use within the TMR schools in Ohio. For that reason, if its significance for vocational evaluation can be determined, it may become an especially valuable tool because it will allow continued reassessment over an extended period of time.

Other rating scales which merit further research with TMR populations would be the San Francisco Vocational Competency Scale because of its wide use which should result in the frequent issuance of new data; and the Vocational Adjustment Rating Scale (Daniels) which is an attempt to utilize the best statements of other rating scales.

Insofar as individual, standardized tests of aptitude, perception and dexterity are concerned, they serve little function except perhaps to provide suggestions for a starting place within the next stage of the rehabilitation process. Showing some promise for this purpose is the Wide Range Employment Sample Test. This test appears to most closely approximate the types of productive activity found in the majority of sheltered facilities. Much more extended research with this test will be necessary, however, before it can be given serious consideration.

Some areas, apparently, remain completely unexplored. Delp in his study listed many jobs in an institutional setting which could apparently be performed by Trainable Retardates but what are the realistic job opportunities in the community? There are a number of "screening" tests for jobs requiring mechanical aptitude, dexterity, etc., but what about service areas - food service, janitorial, patient aide? What about a method of assessing the work personality of the TMR through direct question-response rather than detached observation?

At the present time there are no "proven" predictors of employability - either sheltered or open community, for the trainable mentally retarded. This is the situation in spite of the fact that TMR's are successfully finding not only sheltered but competitive employment in the community.

How many more with similar capabilities are still buried in institutions, activities centers, and terminal sheltered workshops will not be known until effective predictive methods of evaluation are available.

APPENDIX

IDENTIFICATION OF TEST INSTRUMENTS
MENTIONED IN STUDIES

BENDER-GESTALT (Also applies to BENDER VISUAL MOTOR GESTALT): A brief test requiring the copying of designs. Departures from the originals are interpreted in terms of Gestalt laws of perception and organization. Test results are thought to be susceptible to alteration through fatigue and administration procedures.[1] A 1960 survey (Schulberg and Tolor)[2] indicated that 80% of psychologists sampled found the Bender useful for differential diagnosis involving organicity. Predictive validity has been indicated as low. Projective use of the instrument should be with caution.[3] Available from Psychological Corporation.

BENNETT HAND TOOL DEXTERITY: The client is presented with a board on which combinations of nuts, bolts, and washers have been assembled. The combinations are to be disassembled and reassembled on the other side of the Board using three sizes of wrenches and a screwdriver. Some reviewers recommend caution in the use of some of the norms presented because they are based on small, poorly defined groups.[4] Available from Psychological Corporation.

CRAWFORD SMALL PART DEXTERITY TEST: Designed to "measure fine eye-hand coordination." In part one, the testee uses tweezers to place pegs in a board and collars on the pegs. In part two, he utilizes a screwdriver to screw thirty screws in holes. Norming samples are of adequate size and several validation studies have been made.[5] Available from Psychological Corporation.

GOODENOUGH-HARRIS DRAWING TEST: This is an extension of the Goodenough Intelligence Test for ages 3-15. The present version asks the testee to draw pictures of a man, a woman, and himself. Each is scored

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[1]Phillip M. Kitay, "Bender-Gestalt Test", Seventh Mental Measurements Yearbook, ed. Oscar Krisen Buros (Highland Park, New Jersey, Gryphon Press, 1972), Vol. I, p. 394.

[2]Ibid.

[3]Ibid. p. 395.

[4]Karl F. Botterbusch, op. cit.

[5]Ibid. pp. 53f.

on numerous points as a determination of intelligence. In addition, the picture of self was included as a possible projective test of personality to be compared with the other drawings. Results on this experimental use are not promising at this point, however.[1] Unsuccessful attempts have been made to project this test into higher age groups. Thus, although it has been mentioned in at least one study (Wagner and Hawver) it should not be administered to adult groups. Available from Western Psychological Services or Harcourt Brace Jovanovich, Inc.

KOHS BLOCK DESIGN: Developed as a performance test of intelligence. The testee is presented with a series of one inch cubes with different colors on each side. He is then required to duplicate given designs with the blocks. Present availability unknown.

LINCOLN-OSERETSKY MOTOR DEVELOPMENT SCALE: "Designed to test the motor ability of children between the ages of six and fourteen years. It is an individually administered scale consisting of 36 items involving a wide variety of motor skills, such as finger dexterity, eye-hand coordination and gross activity of the hands, arms, legs and trunk. Unilateral and bilateral motor tasks are involved in the scale".[2] Available from the Stoelting Company.

MINNESOTA RATE OF MANIPULATION TEST: (MRMT) An instrument often used in selecting applicants for jobs requiring gross arm-hand manipulatory movements. Consists of two rectangular boards with sixty holes each and sixty cylindrical blocks to fit into the holes. Most commonly used sub-tests are the "Turning" and "Placing" (the only sub-tests in early versions). Now included are "Displacing", "One-hand Turning and Placing" and "Two-hand Turning and Placing". The major norms are unchanged since 1946. Schoenfeldt states that in light of inadequate norm and validity information, users would do well to develop job-specific norms and validity information.[3] Available from American Guidance Service.

O'CONNOR FINGER DEXTERITY TEST: Small pins are inserted by hand in holes in a board. Three pins are inserted in each hole. Reliability seems satisfactory. Care should be taken not to generalize validity for jobs which require other types of manipulative ability.[4] Available from Western Psychological Services.

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[1]Anne Anastasi, "Goodenough-Harris Drawing Test", Seventh Mental Measurements Yearbook, ed. Buros, op. cit. Vol. I, p.670.

[2]Stoelting Company, Psychological Tests and Instruments, 1972 Catalog, (Stoelting Company, Chicago) p. 7.

[3]Lyle F. Schoenfeldt, "Minnesota Rate of Manipulation", Seventh Mental Measurements Yearbook, ed. Buros, op. cit. Vol. II, p. 1483.

[4]Anne Anastasi, Psychological Testing, (The Macmillan Company, New York, 1964), p. 381.

O'CONNOR TWEEZER DEXTERITY TEST: Single small pins are inserted in holes using tweezers. As with Finger Dexterity Test, Anastasi notes that reliability seems satisfactory but there is danger in generalization of results.[1] Available from Western Psychological Services.

PENNSYLVANIA BI-MANUAL WORKSAMPLE: The examinee turns a nut onto a bolt and places the assembly into a hole in a board. Designed to assess finger dexterity, gross arm movement, eye-hand coordination and bi-manual coordination. Norms established for ages 16 through 39.[2] Available from American Guidance Service.

PORTEUS MAZE TEST: The Porteus Maze Test is listed as a performance test of general intelligence. Standard testing procedure is to have the subject trace with a pencil the shortest path from the entrance to the exit of a maze without lifting his pencil from the paper. As soon as an "error" is made by coming in contact with a line or proceeding up a blind alley, the maze is removed and a second trial is given on an identical maze. If another mistake is made, a "failure" is recorded on that level.[3] The test is listed as useful from age three through adult but adult norms are not given. Scores are to be converted to IQ estimates with an additional "0" score based on test behaviors which is correlated with various indices of social adjustment. The test can be administered without verbal instructions. Docter[4] notes that the test seems to detect changes in performance not shown in other tests - such as Wechsler-Bellvue. It therefore seems that maze-solving calls for problem solving competencies not required by many other tests. Present standardization and validation of the test is poor (but entertaining says Horn[5]). Horn states that the user should satisfy himself that (a) the norms apply in the population of which he is concerned, (b) whether or not the test reliability is sufficient for his purposes and (c) what long term practical predictions the test can support.[6] Some test figures for retarded children are included in the revised manual. Available from Psychological Corporation.

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[1]Ibid.

[2]American Guidance Service, 1973 Catalog: Tests and Educational Materials, (American Guidance Service, Inc., Publishers' Building, Circle Pines, Minnesota) p. 25.

[3]Anastasi, Psychological Testing, op. cit. p.248.

[4]Richard F. Docter, "The Porteus Maze Test", Seventh Mental Measurements Yearbook, ed. Buros, op. cit. Vol. I, p. 752.

[5]John L. Horn, "The Porteus Maze Test", Seventh Mental Measurements Yearbook, ed. Buros, op. cit. Vol. I, p. 753.

[6]Ibid. p. 756.

PURDUE PEGBOARD: A widely used measure of hand/finger/arm dexterity and "fingertip" coordination. Pegs are inserted in holes in a wooden board. Each hand is tested separately then the hands together. Finally a four-part assembly is assigned using both hands. Validity and reliability coefficients are low and it is suggested that the test not be used except as part of a test battery.[1] Available from Science Research Associates.

RAVEN COLORED PROGRESSIVE MATRICES: A non-verbal test designed to aid in assessing mental ability by requiring the examinee to solve problems presented in abstract figures and designs. It is printed in several colors and in this form is designed for use with young children and with older persons who are mentally subnormal or impaired.[2] Available from Psychological Corporation.

STANFORD-BINET: A test of general intelligence frequently used by school systems. The test involves a series of tasks for age levels from two years to adult. The tests for each age level are similar in difficulty and alternates are provided. Tests run the gamut from simple manipulation to abstract reasoning.[3] Freides[4] sees the Stanford-Binet as a largely outdated instrument reflecting an anticuated unitary concept of intelligence. He suggests that its only practical usefulness is in testing between the ages of thirty months (the top ceiling for the Bayley Scales of Infant Development) and forty-eight months (the lowest age of the Wechsler Pre-School). He specifically cautions against its use with TMR adults. Available from Houghton Mifflin Company.

VINELAND SOCIAL MATURITY SCALE: A developmental schedule concerned with individual's ability to look after practical needs. The test is composed of one hundred and seventeen items arranged at year levels. Answers are obtained by interview. The Vineland has been used clinically in the diagnosis of Mental Retardation. There is some complaint that the norms are inadequate[5] and there are difficulties in the use of this tool with the institutionalized because they frequently have lacked the opportunity to perform even the tasks of which they are capable. Available from Psychological Corporation or American Guidance Service.

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[1]Botterbusch, op. cit. pp. 57f.

[2]The Psychological Corporation, Test Catalog 1974, (The Psychological Corporation, New York), p. 23.

[3]Anastasi, Psychological Testing, op. cit. p. 195.

[4]David Freides, "Stanford-Binet", Seventh Mental Measurements Yearbook, Buros, op. cit. Vol. I, pp. 772-773.

[5]Anastasi, Psychological Testing, op. cit. pp. 296-297.

WECHSLER ADULT INTELLIGENCE SCALE: (WAIS) This is a descendent of the Wechsler-Bellevue Intelligence Scale and is composed of eleven sub-tests. The verbal score, reflecting to some degree, academic exposure, is composed of the information, comprehension, arithmetic, similarities, digit span, and vocabulary tests. The performance scale, is compiled of digit symbol, picture completion, block design, picture arrangement and object assembly.

The WAIS is the most widely used instrument for assessing adult intelligence although there is much to indicate that cultural minorities come off at a disadvantage in certain subtest areas.[1] It is not known if individual sub-test scores have been examined for predictive features with TMR populations but discussions of the test, stress that sub-tests are not synonymous with factors or special aptitudes.[2] Available from Psychological Corporation.

WECHSLER INTELLIGENCE SCALE FOR CHILDREN: (WISC) This test is quite similar to the WAIS (see above) but is designed for children from five to fifteen (The 1974 revision, WISC-R, is listed for ages 6-0 to 16-11). In general the differences between the two tests involve simplification of scale items similar to those found on the WAIS. Freides echos most critics by concluding: "The WISC is currently the best available compendium of individually administered, subject comparison techniques purporting to measure intelligence."[3] Due to the age range the test is, of course, unsuitable for administration to TMR adults. Available from Psychological Corporation.

WELLS CONCRETE DIRECTIONS TEST: This test is reproduced in full in the MacDonald study (Ferguson-Pinkard project)[4] but is no longer in print. The test was originally used for the selection and classification of Army personnel. The test involves a variety of common objects such as hammer, paintbrush, screw driver about which the testee is given concrete directions of varying complexity. An example: "Place the pliers to the left of the hammer." A more complex example is: "If the hammer is to the left of the screw driver then put the lock to the right of the paint brush and the pliers at the near end of the screw driver. If not, then place the key to the near end of the hammer."

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[1]Alvin G. Burstein, "The Wechsler Adult Intelligence Scale", The Seventh Mental Measurements Yearbook, Buros, op. cit. Vol. I, p. 787.

[2]Leonard A. Miller and C. Esco Obermann, "Intelligence Tests", Studies in Continuing Education for Rehabilitation Counselors, (Materials Development Center, University of Wisconsin, Stout, Menomonie, Wisconsin) p. 7.

[3]R.T. Osborne, "Wechsler Intelligence Scale for Children", Seventh Mental Measurements Yearbook, Buros, op. cit. Vol. I, p. 803.

[4]MacDonald Training Center Foundation, "The Vocational Capacity Scale", op. cit. pp. 24-26.

WIDE RANGE ACHIEVEMENT TEST: (WRAT) An individually administered test of "achievement" in reading (oral pronunciation - not to be equated with comprehension), arithmetic, and spelling. Merwin[1] sees it as impractical for accurate assessment of academic functioning. It is handy for assessing general functioning levels within the three areas for practical purposes such as establishing a functioning base for determination of appropriate further testing. Thorndike[2] seriously questions the validity of the test and the methods used to arrive at much of the statistical data. He definitely encouraged its use for nothing more than a "quick estimate of each person's general level of ability and educational background." Available from Psychological Corporation or Guidance Associates of Delaware.

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[1]Jack C. Merwin, "Wide Range Achievement Test", Seventh Mental Measurements Yearbook, Buros, op. cit. Vol. I, pp. 66-67.

[2]Robert L. Thorndike, "Wide Range Achievement Test", Seventh Mental Measurements Yearbook, Buros, op. cit. Vol. I, p. 68

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